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Impact of Community Pharmacist Interventions With Managed Care to Improve Medication Adherence

Christopher J. Daly, PharmD, MBA, BCACP[1], Kelly Verrall, RPh[2], and David M. Jacobs, PharmD, PhD[1]

Abstract

Background: Nonadherence to medications is a concern due to adverse outcomes and higher costs of care. The Centers for Medicare and Medicaid Services has made adherence a key measurement for Star ratings. **Objective:** To evaluate the impact of a collaborative pilot program between a third-party payer, local pharmacy organization, and academic institution focusing on improving medication adherence with community pharmacies. **Methods:** Twenty-five community pharmacies implemented adherence-based interventions in patients ≥65 years old, who were Medicare Advantage Plan members, taking targeted medications (statins, oral diabetic medications, angiotensin-converting enzyme inhibitors [ACE-Is] and angiotensin receptor blockers [ARBs]). Outcome measures were (1) pharmacy intervention completion rate, (2) type of adherence interventions, (3) change in the proportion of days covered (PDC) following pharmacist intervention based on adherence group, and (4) nonadherence barriers. **Results:** A total of 1263 interventions met the eligibility criteria, and common interventions included explaining the benefit of the medication (n = 453, 35.9%) and provider follow-up (n = 109, 8.6%). Among nonadherent subjects who became adherent, the mean PDC increased by 14% (74%-88%, $P < .0001$), with a 12% decrease in mean PDC score in the nonadherent who remained nonadherent group (71%-58%, $P < .0001$). Common patient barriers for nonadherence were forgetfulness (n = 451, 35.7%) and denial (n = 84, 6.7%). System and therapeutic barriers included complexity (n = 155, 12.3%) and adverse side effects (n = 42, 3.3%). **Conclusion:** This collaborative effort successfully implemented a community pharmacist-led adherence intervention in 25 independent pharmacies. Our findings highlight increased interactions with patients and in some cases improved adherence measures. Future research must include implementation outcomes in order to effectively implement these interventions in the community pharmacy setting.

Keywords

community pharmacy services, community pharmacy, adherence, coordination of care, third-party collaboration

Introduction

Nonadherence to medications is a clinical and health-care industry concern, with nonadherence associated with adverse outcomes and higher costs of care.[1,2] It is estimated that 3 out of 4 Americans do not take their medications as directed.[3] Nonadherence to a medication regimen, whether in terms of timing, dosage, or frequency, can interfere with treatment efficacy, increase complication rates, and reduce quality of life.[4] Poor medication adherence contributes to 125 000 deaths in the United States each year and costs the health-care system nearly $300 billion a year in additional doctor visits, emergency department visits, and hospitalizations.[3-5] Considering that 133 million people have at least one chronic health condition, which is expected to grow to 157 million by 2020, nonadherence is a relevant and ongoing issue that negatively affects patients and health-care dollars.[3]

The Centers for Medicare and Medicaid Services (CMS) view medication adherence for specific classes as a top priority due to these cost and health implications.[6-9] CMS has responded by making medication adherence a key measurement when identifying annual Medicare Part D Star Ratings to measure quality in Medicare Advantage (MA) and Prescription Drug Plans (or Part D plans).[10] CMS mandates plans to

[1] Department of Pharmacy Practice, University at Buffalo School of Pharmacy and Pharmaceutical Sciences, NY, USA
[2] Pharmacy Quality and Medication Therapy Management, Independent Health, Buffalo, NY, USA

Corresponding Author:
Christopher J. Daly, Department of Pharmacy Practice, University at Buffalo School of Pharmacy and Pharmaceutical Sciences, 204 Kapoor Hall, Buffalo, NY 14214, USA.
Email: cjdaly@buffalo.edu

improve the quality of care and general health status for Medicare beneficiaries and to increase the level of accountability for the care provided by physicians, hospitals, and other providers. Community pharmacies deliver care to patients and contribute to the plan performance in the Star ratings. Suboptimal adherence scores result in inadequate Star ratings, therefore lowering the eligible performance dollars to health-care plans.[6,7,9] Measures targeted in this pilot were the 2016 Medicare adherence measures that included medication adherence for diabetes (metformin, sulfonylureas, thiazolidinediones, and dipeptidyl peptidase 4 inhibitors), hypertension (renin–angiotensin system antagonists), and cholesterol (statins) medications.[9] Medicare employs moving thresholds for proportion of days covered (PDC) scores that are updated annually based on market trends and advancements in health care.

Objectives

The primary objective of this study was to assess the impact of community pharmacist-led interventions on the change in adherence metrics. The secondary objectives were to describe patient-specific barriers to adherence and common adherence interventions.

Methods

Consortium Design and Formation

In response to these new mandates, a unique collaboration was established between a local third-party payer, Independent Health, a local pharmacy organization, Pharmacy Association of Western New York (PAWNY), and an academic institution, University at Buffalo School of Pharmacy and Pharmaceutical Sciences (UB SPPS). This unique pilot program ran from February to December 2016 to help improve medication adherence in the Western New York region. This consortium consisted of representatives from Independent Health's Pharmacy Department, PAWNY pharmacists, and UB SPPS faculty. Over approximately 12 months, a mutual mission and vision was established to align services to populations. Leading up to this collaboration, participating pharmacy standards were established along with data collection and intervention tools for documentation and communication. Focused resources on tips for clinical patient care workflow integration were disseminated.

Prior to program launch, Independent Health hosted a continuing education program for the 25 participating pharmacies. The program focused on the importance of medication adherence and proposed interventions to motivate and educate patients on taking their medications as prescribed. The program also set clear expectations and timelines of the interventional pilot, details of the responsibilities of participating pharmacies, outlined the data and payment models, and set expectations for communication and pilot resources.

Independent Health provided 25 local independent community pharmacies with lists of MA Plan members each week based on analysis of claims data. Pharmacies were chosen by PAWNY leadership and willingness to participate in this intervention program. Patients were selected to the list based on the type of medication prescribed, the PDC score, and the gap between expected refill time and the actual filling of the prescription.[11] Potentially noncompliant patients chosen were prescribed a statin, angiotensin-converting enzyme inhibitor (ACE-I), and/or angiotensin II receptor blocker (ARB) or oral diabetic medications. Statins, ACE-Is/ARBs, and oral diabetic agents are commonly prescribed to patients diagnosed with high cholesterol, high blood pressure, and/or diabetes to prevent further disease progression and other severe complications.

Pharmacists from each participating pharmacy then contacted the patients on these lists to assess whether the medications were not being taken properly and to educate individuals about the importance of medication adherence. Based on each individual reason for nonadherence, pharmacists intervened to help improve adherence (eg, recommend a cost-effective option, reach out to the patient's provider to resolve a drug therapy issue, inform the patient about tablet splitting). The pharmacists were required to document each intervention and provide that information to Independent Health. The data provided from the pharmacy interventions on adherence represented an important step in understanding this complex and multifactorial issue and how it impacts Medicare Star Ratings.

Study Design and Population

This quasi-experimental study sought to understand pharmacist-led interventions and their impact on medication adherence measures. Interventions were made by 25 voluntary pharmacies whose patients did not meet established adherence goals set by the third-party payer. These were mutual patients of the pharmacy and third-party provider. No patient referrals were made as a result of this program.

Unique patient interventions were completed by participating pharmacies from February 1, 2016, to December 31, 2016. Patients included were (1) aged $\geq$65 years, (2) actively filling prescriptions from one of the participating pharmacies, (3) members of the Independent Health MA Plan, and (4) taking one or more targeted medications (statins, oral diabetic medications, ACE-Is, and ARBs). Actively filling prescriptions was defined as the patient continuously having their prescription filled at the participating pharmacy. PDC, as determined for CMS Medicare Star ratings, was used to calculate medication refill adherence. Patients with a PDC score for a targeted medication of 80% to 90% and a gap in refills $\geq$10 days or with a PDC score <80% were targeted by the pharmacy staff for an intervention. Exclusion criteria included patients who had not refilled the targeted medication at least twice, patients who were unable to meet the year-end PDC goal based on

days remaining, and any hospitalization, death, or increase in medication dose or discontinuation of the medication during the study period.

Data Source

The third-party administrator provided a data form with pertinent patient information for the pharmacy to complete the adherence intervention. Data were collected directly from the pharmacy by the third-party via data collection forms (Appendix A). This information was communicated on a weekly basis. Any patient-specific feedback was sent to the program administrator through Health Insurance Portability and Accountability Act (HIPAA)-compliant encrypted methods, which allowed for patient collaboration between the participating pharmacy and third-party administrator.

Data collected from the pharmacy and third party included the reasons for nonadherence, type of intervention, the person making the intervention, date of the intervention, length of time of the intervention, the intervention medication, day supply of the medication, PDC for the medication, and the gap in refill time. Information from 2 groups was analyzed to determine whether the interventions improved adherence by comparing if they met PDC scores before and after the intervention. The type of intervention was at the pharmacist's discretion and was recorded on the data collection form.

Payment Model

The adherence intervention was based on a fee-for-service and pay-for-performance bundled model. Independent Health reimbursed the pharmacies for each patient intervention they completed. The payment level was set to a reasonable threshold that reflected the time taken by a pharmacist to complete the adherence intervention. The pharmacies received additional reimbursement if the intervention resulted in the patient becoming adherent to his or her medication regimen. The process for determining whether an intervention was completed to count for initial payment included a determination that a conversation with the member and/or their caregiver and/or their prescriber occurred discussing one or more of the following criteria: importance of taking the medication, the reasons for nonadherence, and offering possible solutions to the problem. Simply "refilling the medication" was not considered an intervention. Also, a "discontinued" medication only counted as an intervention if the pharmacist confirmed the discontinuation with the prescriber. The process for determining whether an intervention led to a successful outcome included a member reaching the PDC $\geq$80% threshold for medication adherence, which was calculated by member according to the CMS calculations.[7] Adherent members were matched against members who had a completed intervention, and if both criteria were met, the additional payment was awarded for the intervention/outcome.

Statistical Analysis

Descriptive analyses were conducted to assess the distribution of sample demographics and intervention characteristics. Paired *t* tests were conducted to assess the differences in mean PDC values across the intervention groups. Due to the bifurcation of the sample based on pre- and post-PDC scores, 4 adherence groups were created: (1) nonadherent who remained nonadherent, (2) nonadherent who became adherent, (3) adherent who became nonadherent, and (4) adherent who remained adherent. Nonadherent was defined as subjects with a PDC <80% or a PDC score $\geq$80% and $\leq$90% with a gap in refills of $\geq$10 days. Adherent was defined as a PDC $\geq$80% with a gap in refills of <10 days. A P value <.05 was considered statistically significant, and analyses were conducted using SAS software, version 9.4 (SAS Institute Inc, Cary, North Carolina).

Results

Approximately 4500 interventions were collected from February 1, 2016, to December 31, 2016, including approximately 3100 partial and 1400 completed interventions totaling to 1215 unique patients. It was possible for patients to receive more than one adherence intervention (eg, oral diabetics, renin–angiotensin–aldosterone system [RAAS] agent, or statin) contributing to the difference between interventions and unique patients. Partial interventions contributed to the weekly running on adherence metrics for patients who had incomplete interventions. Completed interventions were those that met the third-party threshold for quality and submitted on time. Updated patient statistics were rendered to the pharmacy to continue with the intervention. Toward the end of the calendar year, if the patient was no longer eligible for an intervention due to inadequate days remaining to meet the 80% threshold, the patient was excluded from the target list. Additional interventions were excluded due to the following parameters: interventions without pre-PDC score only (n = 33), interventions without post-PDC score only (n = 25), interventions reporting patient was hospitalized only (n = 45), interventions reporting patient deceased (n = 25), combination no pre-PDC and deceased (n = 1), combination no post-PDC and hospitalized (n = 2), combination no pre-PDC and hospitalized (n = 1), and combination no post-PDC and deceased (n = 5). In total, there were 137 interventions excluded (Figure 1). Excluding subjects due to hospitalization or death is consistent with Medicare Part D adherence metric calculations.[7] The final study sample included 1263 completed interventions representing 1110 unique patients.

A majority of patients (81%) started at a PDC score >70%, providing pharmacies with a reasonable chance to impact outcomes. Patients starting with a PDC score <60% were less likely to become adherent and imbalance the results. The

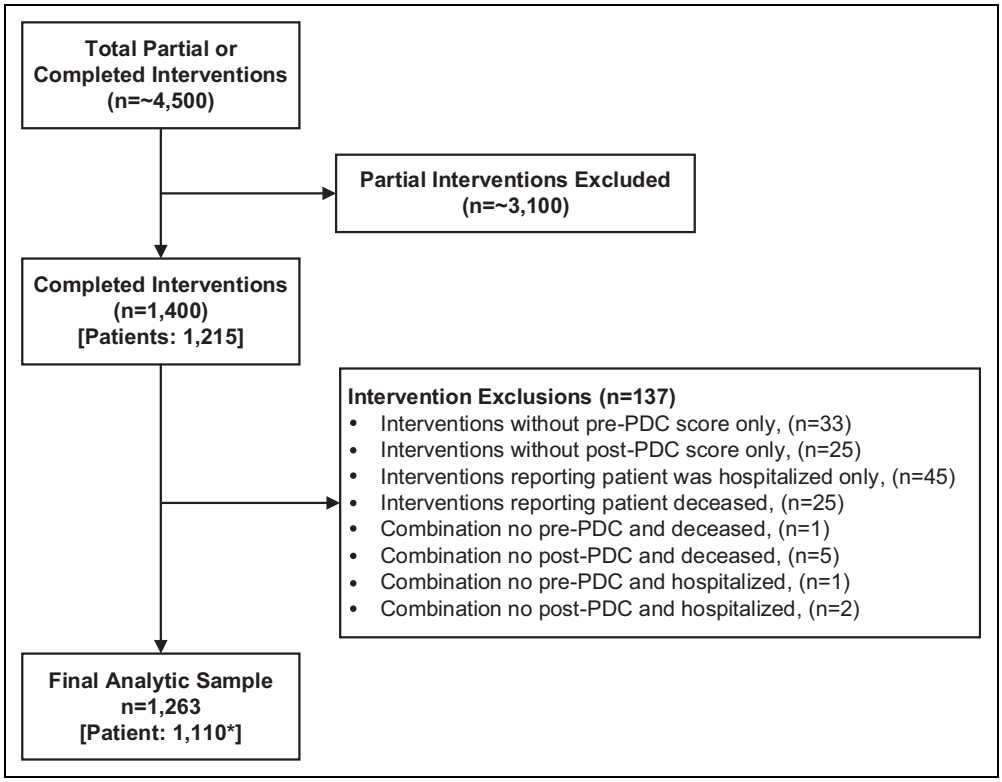

Figure 1. Study flowchart. *Patients could receive more than one adherence intervention (eg, oral diabetics, RAAS agent, or Statin). PDC indicates proportion of days covered.

Table 1. Description of Baseline Intervention and Pharmacy Characteristics Among Completed Interventions.

	No. (%)
Total intervention [patients]	N = 1263 [1110]
Initial PDC scores	
≤60%	40 (3.2%)
61%-70%	147 (11.6%)
71%-80%	415 (32.9%)
81%-90%	661 (52.3%)
PDC (mean ± SD)	78.7 ± 8.8%
No. of intervention types	
Single	556 (42.9%)
Dual	740 (57.1%)
Drug class	
Oral diabetic	82 (6.5%)
RAAS agents	505 (40.0%)
Statin	676 (53.5%)
Pharmacy characteristics	
No. of pharmacies	25
Refill reminder program in place prior to the intervention	19 (76%)
Interventions, mean ± SD	50.52 (31.93)
Minimum	8
Maximum	135

Abbreviations: PDC, proportion of days covered; RAAS, renin-angiotensin-aldosterone system; SD, standard deviation.

average starting PDC was 78.7% ± 8.8% (Table 1). A majority of patients (57.1%) received dual interventions from pharmacists having reported completing 2 different adherence interventions. Completed drug class interventions included statins (52.2%), RAAS agents (39%), and oral diabetic medications (8.9%). Twenty-five participating pharmacies contributed to completing the interventions (Table 1). A majority of pharmacies (76%) confirmed having a formal adherence or refill reminder program prior to this intervention. The average number (±standard deviation) of interventions completed per pharmacy was 50.5 ± 31.9. There was a large difference in volume of interventions completed, with the highest performing pharmacy completing 135 interventions and the lowest performing pharmacy completing 8 interventions.

Primary reasons for medication nonadherence were categorized for each completed intervention (Table 2). The most frequent reasons for nonadherence included patient (45.3%), system (16.5%), and therapeutic barriers (2.7%). Among patient barriers, the most common reasons for nonadherence were forgetfulness (n = 451, 35.7%) followed by denial (n = 84, 6.7%). Common system barriers included complexity (n = 155, 12.3%) and lack of refills (n = 24, 1.9%). The main therapeutic barrier was adverse side effects (n = 42, 3.3%), We identified measures that were outside the control of the third party and pharmacy but still impacted the PDC calculation based on CMS Part D criteria. We categorized these as factors having a negative impact on PDC, and these were multifactorial in nature. The categories that contributed to a reduction in post-PDC scores included unknown (n = 300, 23.8%), provider

Table 2. Description of Barriers for Nonadherence to Medications.

Nonadherence Category	No. (%) (Total N = 1263)
Patient barriers	n = 572
Forgetfulness	451 (35.7%)
Denial	84 (6.7%)
Motivation	37 (2.9%)
System barriers	n = 209
Complexity	155 (12.3%)
Refills	24 (1.9%)
Other pharmacy	22 (1.7%)
Cost	6 (0.5%)
Transportation	2 (0.2%)
Therapeutic barriers	n = 43
Adverse side effects	42 (3.2%)
Drug interactions	1 (0.1%)
Factors that led to a negative impact on PDC[a]	n = 439
Unknown	300 (23.8%)
Provider discontinued	105 (8.3%)
Cash	20 (1.6%)
Samples	14 (1.1%)

Abbreviation: PDC, proportion of days covered.
[a]Measures outside the control of the third party and pharmacy that negatively impacted the PDC measure based on Centers for Medicare and Medicaid Services Part D criteria.

Table 3. Types of Primary Interventions Made by Pharmacists Over the Study Period.

Intervention Type	No. (%) (Total N = 1263)
Explain the benefits of the medication/motivate to take	453 (35.9%)
Unknown (intervention was not reported by pharmacist)	449 (35.6%)
Called responsible provider to confirm medication was appropriately discontinued	109 (8.6%)
Recommended pill box or other reminder system	91 (7.2%)
Correct the directions on prescription (and cancel refills for the wrong directions)	53 (4.2%)
None	40 (3.2%)
Contacted provider for refill or new script	22 (1.7%)
Change to 90-day supplies (fewer times to remember to refill and lower copay)	18 (1.4%)
Talk about side effects	12 (1.0%)
Change to a different product	6 (0.5%)
Change to tablet splitting	6 (0.5%)
Referral to provider	2 (0.2%)
Patient medication therapy management appointment	1 (0.1%)
Put on delivery	1 (0.1%)

discontinued the medication (n = 105, 8.3%), and patient paying cash for the medication (n = 20, 1.6%).

The adherence interventions completed by pharmacists over the study period were diverse (Table 3). The participating pharmacies had the option to complete a single or dual intervention to address the identified adherence issue; however, only the primary intervention was captured and displayed. The most common interventions completed and submitted to the third party included: explain the benefits of the medication/motivational interactions (n = 453, 35.9%), unknown (n = 449, 35.6%), called provider to confirm medication was discontinued (n = 109, 8.6%), and recommended pill box or other reminder system (n = 91, 7.2%). Motivational interactions were defined as health behavioral interviewing techniques that were utilized by the pharmacies in the intervention. These were covered in detail at the initial continuing education program.

All patients received adherence interventions. Patients were then categorized into the following groups based on pre- and post-PDC scores: nonadherent who remained nonadherent (n = 435), nonadherent who became adherent (n = 167), adherents who became nonadherent (n = 159), and adherents who remained adherent (n = 502; Table 4). Among nonadherent subjects that became adherent, the mean PDC increased by 14% (74%-88%, $P < .0001$). There was a 12% decrease in mean PDC scores in the nonadherent who remained nonadherent group (71%-58%, $P < .0001$) and an 18% decrease in mean PDC in the adherent that became nonadherent group (83%-65%, $P < .0001$). Patients who were adherent and remained adherent showed minimal change in PDC scores.

The changes in PDC scores were further examined to better understand which type of intervention improved adherence (Table 5). Among subjects who were nonadherent who became adherent, the most common intervention (n = 62) was counseling the subject on the benefits of the medication, which led to a significant increase in the subjects' PDC scores (absolute difference: 0.14, 95% CI, 0.11-0.16; $P < .01$). Recommending a pill box or other reminder system within this group also resulted in a significant increase in PDC score (absolute difference: 0.13, 95% CI, 0.08-0.18; $P < .01$). Within the subsequent groups, a variety of interventions were applied.

Discussion

This study aimed to improve adherence among patients common to both a third-party payer and a network of local community pharmacies. We show that pharmacists were able to complete 1263 interventions in patients with poor adherence measures and that in some cases these interventions improved adherence metrics. The most beneficial pharmacist interventions that led to a positive impact included explaining the benefits of the medication, motivational interactions, and recommending a pill box or other reminder system. Since adherence is a multifactorial issue, it is difficult to select a single intervention that led to the most impactful PDC change.[12] One intervention may be insufficient to impact adherence measures; however, this study provides empirical evidence that community pharmacists working with managed care can implement a successful adherence intervention.

We also observed a decrease in adherence measures among certain subcategories, perhaps in part due to how managed care organizations apply the Medicare Part D Star standards. Previous studies have suggested that patient behaviors and outcomes that may not be modifiable may still have a negative impact on the PDC calculation.[13] These negative influences on PDC can

Table 4. Change in Proportion of Days Covered (PDC) Following a Pharmacist Intervention Based on Adherence Group.

Group	Number of Matched Pairs	Baseline PDC (Mean ± SD)	Follow-Up PDC (Mean ± SD)	Absolute Difference[a]	95% CI	P[b]
Nonadherents who remained nonadherent	435	0.71 ± 0.08	0.58 ± 0.18	−0.12	−0.14 to −0.11	<.0001
Nonadherents who became adherent	167	0.74 ± 0.05	0.88 ± 0.07	0.14	0.13 to 0.16	<.0001
Adherents who became nonadherent	159	0.83 ± 0.03	0.65 ± 0.16	−0.18	−0.20 to −0.15	<.0001
Adherents who remained adherent	502	0.86 ± 0.03	0.88 ± 0.04	0.02	0.01 to 0.02	<.0001

Abbreviations: CI, confidence interval; SD, standard deviation.
[a]Absolute difference is the difference of follow-up PDC and baseline PDC.
[b]*P* values are based on paired *t* tests for continuous PDC.

Table 5. Change in PDC Score Following a Pharmacist Intervention Based on Adherence Category.[a,b]

	Nonadherents Who Became Adherent (n = 167)			Adherents Who Remained Adherent (n = 502)		
Type of Intervention	Pairs	Absolute Difference	95% CI	Pairs	Absolute Difference	95% CI
Explain the benefits of the medication/motivate to take	62	0.14	0.11 to 0.16	226	0.02	0.01 to 0.03
Unknown	59	0.14	0.12 to 0.17	175	0.02	0.01 to 0.03
Called responsible provider to confirm medication was appropriately discontinued	6	0.19	0.05 to 0.34	11	0.02	−0.01 to 0.04
Recommended pill box or other reminder system	15	0.13	0.08 to 0.18	46	0.02	0.01 to 0.03
Correct the direction on prescription	6	0.11	0.01 to 0.22	14	0.03	0.01 to 0.04
None	7	0.19	0.08 to 0.29	8	0.04	−0.01 to 0.09
Contacted provider for refill or new script	6	0.15	0.01 to 0.29	9	0.01	−0.01 to 0.04
Other	6	0.14	0.01 to 0.26	13	0.02	−0.01 to 0.05

Abbreviations: CI, confidence interval; PDC, Proportion of Days Covered.
[a]Interventions with less than 20 were categorized as other (total n = 19): change to 90-day supplies, talk about side effects, change to a different product, change to tablet splitting, referral to provider, patient medication therapy management appointment, put on delivery.
[b]All differences in PDC score were statistically significant ($P < .05$).

ultimately have an adverse effect on Star ratings for third-party payers. These are considered out of payer and pharmacy control and include receiving samples from providers, patient hospitalizations, and death that has not been reported to the third party. These incidences were noted as the third party did not have prior knowledge, thus negatively impacting PDC after pharmacy discovered the reason. Another factor that contributed to a decline in post-PDC scores included medication discontinuation after 2 fills in the calendar year.

The increased interactions of community pharmacies with the managed care organization contributed to the design of the adherence interventions. The collaboration started with the shared vision drafted by all parties, and it was through these shared goals that we developed our joint venture. The interventions were based around set standards including quality, responsibilities, intervention and payment details, outcomes measured, data quality and integrity, and timelines. Other characteristics of the collaboration included holding an initial continuing education program, communication through data encrypted e-mail, using a simple data collection form (eg, in MS Excel 2010), and sharing patient information through a regional health information organization (ie, HEALTHeLink). The current legal structure between the pharmacies and payer aided the payment and clinical models. The PAWNY and pharmacy relationship promoted pharmacy advocacy and model development, while the managed care and pharmacy relationship leveraged mutual patients, payments models, and maintaining HIPAA compliance. The UB SPPS faculty relationship expanded capabilities with the development of continuing education and access to alumni, preceptors, mentors for students, knowledge sharing, and data analytics. The success of this intervention centered on the collaboration between all parties and the common goals set forth at the beginning of this endeavor.

Past collaborations between community pharmacy and managed care have also been successful.[14-16] The key elements driving the success of these collaborations are leveraging the relationship between community pharmacies and patients, effectively and efficiently utilizing the analytics provided by the managed care organization, and promoting interprofessional collaboration. Studies with interventions based on the hub-spoke model require entities to communicate proper information. A hub-spoke model depends on a strong central organizer "hub" and the ability to communicate to the decentralized partner "spoke" intervention details and provide timely quality feedback. Pharmacies need actionable concise information to be able to act effectively in order to improve patient care. Through third-party collaboration, the provided analytics can

help sharpen the approach to specific patients; however, this information must also be accurate. Provider acceptance rates of vetted pharmacy adherence interventions are a major concern of quality improvement initiatives.[14] Therefore, success is seen when the community pharmacy is closely affiliated to or integrated with the providers through proper communication. If pharmacists are integrated into the clinic setting, then the resolution of the medication issues becomes more efficient.[15] This study did not have integrated pharmacists but encouraged the resolution of any discrepancies directly with the responsible provider, which we believe led to an increase in interprofessional collaboration.

Previous adherence initiatives involving only managed care organizations focused entirely on community outreach in order to build patient relationships.[14] This reliance on indirect methods of nonadherence collection has certain limitations. One study was limited to collecting information on prescriptions filled from pharmacies outside the network or processed as cash. Also, medication samples or hospitalizations during the follow-up period complicated accurate adherence assessment.[17] We observed a similar phenomenon, where factors outside the control of the pharmacy or managed care negatively impacted adherence measurements. Overestimation of adherence can be also linked to the promoted dispensing model of narrow pharmacy networks or mail order pharmacies. Barriers to adherence are sometimes multifactorial and can be lost in this intervention method.[18] By not linking pharmacies with medical claims, the intervention may be limited in receiving an accurate diagnosis.[17] Further, missing an element of the patient care team may lead to incomplete adherence measures, which can negatively impact patient care. In the intervention, pharmacists were able to successfully work with the patients, providers, and managed care in order to submit completed interventions. This multidimensional approach serves as an example for future collaborations between different parties.

Community pharmacy has a long history of commitment to establishing quality improvement initiatives focused on improving patient adherence.[2,19-21] Community pharmacies have moved beyond the dispensing model, successfully implementing adherence measures using appointment-based medication synchronization,[2] automatic prescription refill programs,[20] and disease state management programs[21,22] focused on adherence. Overall, medication adherence programs not only have a positive impact on patient outcomes but also a positive financial influence in which the community pharmacy reimbursement is augmented by quality and dispensing payment metrics.[19] Our network pharmacies used all of these characteristics as well as offering established in-house adherence programs to patients in this program.

Limitations

The study had several limitations. First, the results indicate 449 "unknown" interventions among the 1263 completed interventions. These unknowns were the result of incomplete data fields describing the intervention type, which may be attributable to some pharmacies not having up-to-date Microsoft Excel software or improper use of the Excel spreadsheet. To rectify this, we have since updated the data collection tool based on pharmacist feedback. Further, in some cases, the Excel data sheet sent from the pharmacies included limited data on the primary intervention completed and only one nonadherence category indicated for each patient. Patient can present with multiple barriers to nonadherence and this may require multiple interventions. Given the real-world nature of this study, missing data fields were to be expected, and we are currently working with the pharmacies to improve the case report form and data collection process. For PDC calculations, the study used the same standards used to grade third parties from Medicare Part D Star ratings. This led us to develop a subsequent category of factors that negatively impact PDC but are outside the control of managed care. These included paying cash for prescriptions or providers supplying samples. Future studies should be designed to better understand how these factors impact PDC scores. We were not able to provide demographic data on patient characteristics due to data restrictions with the third-party payer. A better understanding of baseline characteristics would have aided the analysis and focused future interventions. In addition, this study lacked an observational control group, which limited analysis and conclusions on the impact of our interventions. However, this study provides a framework for the successful implementation of an adherence intervention with collaboration between academia, pharmacy organizations, and managed care. Our future studies will include a control group in order to better evaluate both clinical and implementation-based outcomes.

Conclusions

The consortium successfully designed, implemented, and analyzed community pharmacist-led adherence interventions in collaboration with a third-party provider and academia. Community pharmacists were able to increase interactions with patients and in some cases improve adherence measures. Most community pharmacies face workflow implementation barriers when instituting new interventions into practice. However, the opportunity to improve adherence outcomes is a valued intervention and can be administered through a third party looking to target certain members. Interventional data from the pharmacy to the third party are valued and should be streamlined for completeness, accuracy, and clinical content. The need for efficient electronic exchange of information will be key to the expansion of set services. Academia plays a key role in the study design, effectiveness of clinical output, and integration of the collaboration into didactic and experiential aspects of student training. Future research must include implementation outcomes (eg, acceptance, adoption, fidelity, sustainability) in order to better understand how community pharmacists can effectively implement these interventions. A focus on implementation would help to address the barriers that most community pharmacies face when instituting new interventions into practice.

Appendix A. Data Collection Form. Hosted in MS Excel 2010 With Drop-Down Option.

Date of Intervention	Nonadherence Reason	Intervention with	Intervention Type	Refilled Medication	Comments	Complete	Attestation	Duration (minutes)
MM/DD/YYYY	Forgets to take or to refill	Patient	Called responsible provider to confirm medication was appropriately discontinued	Yes		Yes	I attest	0-5
	Cannot afford	Caregiver	Change to 90-day supplies (fewer times to remember to refill and lower copay)	No		No		6-10
	Side effects (real or perceived)	Prescriber	Change to a different product					11-20
	Does not believe medication is necessary	Both patient (caregiver) and prescriber	Change to a generic less expensive product					21-30
	Changed/ misunderstood directions		Change to tablet splitting					31-40
	Hospitalization		Correct the directions on prescription (and cancel refills for the wrong directions)					41-50
	Provider discontinued		Explain the benefits of the medication/motivate to take					51-60
	Other: please specify		Other: please specify					
			Recommended pill box or other reminder system					
			Talk about side effects					

Authors' Note

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ORCID iD

David M. Jacobs, PharmD, PhD https://orcid.org/0000-0001-9240-7067

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