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The Pennsylvania Project: Pharmacist Intervention Improved Medication Adherence And Reduced Health Care Costs

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ABSTRACT **Improving medication adherence across the health care system is an ingredient that is vital to improving patient outcomes and reducing downstream health care costs. The Pennsylvania Project, a large-scale community pharmacy demonstration study, evaluated the impact of a pharmacy-based intervention on adherence to five chronic medication classes. To implement the study, 283 pharmacists from a national community pharmacy chain were assigned to the intervention group. Collectively, they screened 29,042 patients for poor adherence risk and provided brief interventions to people with an elevated risk. Compared to a control group of 295 pharmacists who screened 30,454 patients, the intervention significantly improved adherence for all medication classes, from 4.8 percent for oral diabetes medications to 3.1 percent for beta-blockers. Additionally, there was a significant reduction in per patient annual health care spending for patients taking statins ($241) and oral diabetes medications ($341). This study demonstrated that pharmacist-provided intervention is a cost-effective tool that may be applied in community pharmacies and health care sites across the country.**

Effective strategies for improving medication adherence are viewed as essential to improving patient care[1] and patient outcomes[2,3] and to reducing total health care costs.[4] Patients with chronic conditions, who represent the greatest number and costs to the US health care system, consistently have poor medication adherence: Only 33–50 percent of such patients adhere completely to their prescribed medication regimen.[5–7] The reasons behind medication nonadherence are complicated and often rooted in social and economic issues.[1]

One important health reform feature, which has increased Medicare Advantage (MA) payers' interest in improving medication adherence, is the Centers for Medicare and Medicaid Services' (CMS's) Medicare Star Rating System,[4] implemented in 2013. This system provides significant financial advantages to MA payers when their enrollees' adherence, measured via several common chronic disease medication classes, is specifically improved. However, common medication adherence strategies such as refill reminders, pill box provision, and targeted patient care management programs have had limited impact on improving an entire MA population's adherence and, therefore, would not likely result in increased star ratings.[8]

Background

UNTAPPED RESOURCES: THE COMMUNITY PHARMACIST The community pharmacy is an untapped resource as a stand-alone strategy for improving medication adherence at the population level.[9] There are approximately 55,400 community pharmacies across the United States.[10] A community pharmacy dispenses medication and provides professional counseling and other

pharmacy services to people in a local area. A community pharmacy can be part of a large chain (such as Rite Aid), it can be located in a grocery store, or it can be independently owned. Of all prescriptions, an estimated 56 percent are filled in a chain pharmacy, 15 percent in an independent pharmacy, and 20 percent by mail order.[11]

Medication therapy management is the best-known systematic patient intervention provided by community pharmacies. However, it focuses mainly on the most clinically complex patients at highest risk for nonadherence and has generally been ineffective in improving adherence across an entire patient population.[12] Instead, effective interventions that target patients at a broader array of nonadherence risk levels are thought to be essential to improving population adherence rates.[13] Community pharmacies provide an ideal setting for applying these interventional models, as approximately 71 percent of all patients receive their medications from a community pharmacy.[11] Further, the effective application of these interventional models could provide community pharmacies with the business case to sustain them in two ways: improved prescription revenues across a large number of medications and patients, and the opportunity to negotiate new financial incentive models with Medicare, Medicaid, and commercial payers.[14]

Several authors have recommended a model that uses a broad screening tool (which would effectively assign patients into adherence risk strata) coupled with an individually tailored intervention for improving population adherence.[15] We applied this model, called screening and brief intervention, within community pharmacies. The model involves a brief universal screen that indicates patient adherence risk, followed by a pharmacist-led brief intervention provided to patients at elevated risk. Brief interventions are pharmacist-led two-to-five-minute conversations using motivational interviewing principles. Motivational interviewing focuses on exploring and resolving a patient's ambivalence and centers on motivational processes within the individual that facilitate change. Brief interventions are arranged as the typical pharmacy encounter would occur. This method is effectively used in other health care settings, especially in integrated health care models.[16]

THE PENNSYLVANIA PROJECT In 2010 the Pennsylvania Project, a large-scale community pharmacy study, was conducted to evaluate the impact of screening and brief intervention on population-level medication adherence rates and health care costs. The project was funded by the Pharmacy Quality Alliance via a competitive application process. Project participants included Highmark, a large regional Blue Cross Blue Shield–affiliated health plan that provided both commercial and Medicare Part D products; Gateway, the Medicaid health plan associated with Highmark; Rite Aid Corp.; the technology company CECity Inc.; and the University of Pittsburgh School of Pharmacy.

In this article we describe the impact of the screening and brief intervention on medication adherence among five common chronic disease medication classes and on downstream health care costs.[17] We present key findings from our demonstration project and discuss ways of applying this intervention within other community pharmacies.

Study Data And Methods

The study design was quasi-experimental. Pharmacies were assigned to the intervention or control groups based upon a comparison of census data for the ZIP codes in which the pharmacies were located, to ensure that the distributions for resident age, race or ethnicity, and per capita income were similar between the intervention and control pharmacies. Moreover, intervention and control pharmacies were located in different organizational districts that were sufficiently distant from each other so that pharmacists would not be shared between groups.

Interventions took place during the twelve-month period January–December 2011. Estimates of study effects were based on the changes in intervention patients' adherence from the year before the study to the year after, relative to the same change over time among control patients.

The project measured the effect of the screening and brief intervention approach on medication adherence for medication classes commonly associated with chronic disease management and total downstream health care costs. These medication classes included calcium channel blockers, oral diabetes medications, beta-blockers, statins, and renin angiotensin system antagonists (RASA). Oral diabetes medications, statins, and RASA are used in the Medicare Star Ratings System.

Performance assessment reports, provided via the CECity cloud-based platform, were provided monthly to each participating pharmacist. These reports included updates of each pharmacy's medication adherence rates compared to payer-established benchmarks, peer comparators, and the pharmacy's longitudinal performance. Pharmacies used these reports to help motivate their use of the intervention and to help them understand the degree to which the application of the interventions was improving medication adherence for specific medication classes.

DATA SOURCES The drug claims data provided by Highmark and Gateway health plans included date of service (medication receipt), national provider identifier, pharmacy type, national drug code, generic code number, days of supply, quantity dispensed, and allowed cost. The medical claims data included date of service, primary diagnosis, other current diagnoses, place of service, type of claim, and allowed cost. The unit of observation in these data was a single patient encounter with a pharmacy (prescription fill) or a health care provider (visit), which were used to construct medication adherence measures for each patient. Medications were identified using the generic code number, and diagnoses were identified using *International Classification of Diseases*, Ninth Revision (ICD-9), codes. Health care facilities were identified from text entries categorized as hospital inpatient, hospital outpatient or emergency department (ED), urgent care, or other doctor's office visit.

SELECTION AND DESCRIPTION OF PARTICIPANTS Eligible participants were age eighteen or older, were insured by one of the participating health plans (such as commercial, Medicare, or Medicaid), and received at least two medication fills at one of the intervention or control pharmacies for one of the targeted medication classes. From the 107 intervention pharmacies and 111 control pharmacies, 29,042 and 30,454 patients were identified, respectively.

PHARMACIST-PROVIDED INTERVENTIONS Patients at each intervention pharmacy were given one of two instruments. The first was derived from the Adherence Estimator,[18] a validated three-item questionnaire that was issued to patients with new prescriptions. The questionnaire score (8–36) identified patients at risk for primary medication nonadherence. The second instrument was used for patients receiving prescription refills and was derived from the Outcome Rating Scale,[19] a validated four-item visual analog scale that assessed patients' self-reported well-being (a score of >26 centimeters indicated by the measurement of lines on four 10-centimeter rating scales). This screen has been used in pharmacy settings and was demonstrated to be associated with improving medication adherence among MA patients.[20] Patients in the intervention group whose scores exceeded predetermined thresholds from either screening instrument received a brief intervention from the pharmacists.

Pharmacists at the control-group pharmacies did not receive the cloud-based performance assessment reports and delivered only standard care. Standard care consisted of accurate interpretation and filling of prescriptions and infrequent nonsystematic counseling on the medication that might address drug-drug interactions, preventing adverse events, encouraging appropriate medication use, and counseling on the disease state. Auto-fill programs did exist at both sets of pharmacies, but claims were not processed unless the patient picked up the medication. The pharmacy organization provided no deep discount programs.

This project targets several salient considerations in the changing US health care landscape.

TRAINING Project "teachers" were derived from managers within the community pharmacy organization. These teachers received a day long training session on the screening and brief intervention approach. They were taught how to implement the approach in the normal course of pharmacy work; how to effectively and reliably provide brief interventions; how to use the cloud-based platform to establish pharmacy adherence performance thresholds and establish methods for improving them; and how to effectively train pharmacists and technicians on the intervention. The 283 pharmacists at the intervention stores received a half-day training provided by the project teachers and other study personnel on the topics described above. After completion of the training, all pharmacists met at least minimal proficiency as determined via a proficiency checklist. To be deemed proficient, pharmacists were observed as they role-played effectively administering screenings and brief interventions with standardized patient cases.

Throughout the study, the project teachers visited each intervention store to answer questions and to assist with implementation. Regular conference calls were conducted with field management at the community pharmacy organization regarding ways to reinforce the study's consistent and sustained implementation. Monthly calls were made to each pharmacist at each intervention store using an implementation assessment survey developed for the study, and scores were reported monthly to the community pharmacy organization's management and the teachers. A run chart—or a graph that displays observed data in a time sequence—based upon the implementation scores indicated that stable

implementation was reached for approximately 75 percent of the pharmacies in about two months.

OUTCOMES Medication adherence was measured by whether a patient achieved a proportion of days covered of 80 percent or greater (PDC80).[21–22] PDC80 is a conventional claims-based measure of adherence that is calculated for each patient-medication class and is considered to represent the minimal medication dose that would likely result in the desired clinical outcomes.[23] The proportion of patients achieving a PDC80 is the metric used in the Medicare Star Rating System.[4] Through the application of automated algorithms, we ensured that patients changing medications within a class did not reduce their adherence measurements and that overlapping days of supply were not double-counted.

The intervention began December 1, 2010, but analyses were adjusted to start January 1, 2011, to avoid any end-of-year effect resulting from insurance benefit design or continuous enrollment changes. PDC80 was calculated for each patient for the twelve months before and during the intervention (January 1 to December 31, 2010, and January 1 to December 31, 2011). The denominator for the PDC80 was the total number of days from the first eligible fill (patient medication possession) through the end of the measurement year. We present outcomes for patients whose first eligible medication fill occurred at least 270 days prior to the end of the observation period. The decision to use this time frame reflects a compromise between reducing the size of the analysis sample (excluding patients who did not happen to fill a prescription early enough in the intervention period) and reducing the period of measurement. Sensitivity analyses were conducted using alternative measurement periods (such as 180 days and 300 days), to assess the influence of noncontinuous enrollment and other confounders. Health care costs (allowable charges on the claims for the years 2010 and 2011) were constructed as the sum of all allowable charges (which best reflect the amount that payers ultimately pay)[24] reported by the participating health plans during the twelve months before and during the intervention. These include charges for all ambulatory (including labs and tests), ED, and inpatient care, as well as pharmacy costs. Mean health care costs by study group and these health care domains are included in online Appendix Exhibit 1.[25]

STATISTICAL ANALYSIS Because the study lacked random assignment, a propensity score approach was used to improve balance and comparability between the control and intervention patient groups. To optimize the balancing of factors that could affect patient responses, the doubly robust estimator was used for all outcomes, as it uses both inverse propensity score weighting and covariate controls.[26]

The control variables in both the propensity score model and the outcome model were age, sex, insurance indicators, and preintervention characteristics: proportion of days covered in the relevant medication class; total health care costs; and indicators of diagnoses for hypertension, dyslipidemia, and diabetes. This model also used the length of observation of patient-pharmacy engagement as a covariate, which permitted the control for differences in patients' pharmacy use behavior and length of time in the study. The intervention and control groups were equal with respect to the proportion of patients enrolled in each insurance product and pharmacy script volumes, so these variables were not included as covariates. The PDC80 was estimated as a probit, and results were transformed into percentage-point differences. To account for pharmacy effects (demonstrated also by the heteroscedasticity and clustering of patients within pharmacies), Huber-White "sandwich" robust standard errors[27] were used, and random effects were modeled at the pharmacy level. See the Appendix for a detailed description of the statistical analysis.[25]

LIMITATIONS The study used medication and health care claims data to evaluate its major research question. Medication claims data assume that a prescription filled is consumed, which is not always true. These data also do not reflect prescriber instruction changes. Further, these data do not account for prescriptions filled outside of the targeted pharmacy. Nonetheless, medication claims data are commonly used by researchers, payers, and purchasers (for example, CMS) to represent medication adherence across large patient populations such as used with this study.[28] Finally, health care claims data are viewed as appropriate for evaluating changes in health care spending especially as analyzed in this study[29] and have been used to evaluate the impact of downstream health care spending realized from improved medication adherence.[3]

The study did not collect information on other pharmacy interventions that the patients may have received at the control or intervention pharmacies or complex psychosocial information on the patients studied that could have affected adherence behavior. However, there is no reason to believe that the frequency of the nonsystematic and infrequent interventions that occurred as part of standard care within the pharmacies would have been different between the intervention and control pharmacies, especially given that the groups were balanced by key census

factors and via propensity score multivariate modeling. Moreover, the multivariate propensity score modeling also helped balance the groups for unmeasured patient characteristics.

Although adherence is often analyzed for aggregated patients within stores or providers, this study centers on evaluating the effect of the screen and brief intervention on patients. Framing the analyses around patients is useful scientifically and corresponds to substantial peer-reviewed literature.[30,31]

Finally, effective interventions for medication adherence will likely be capped, as individual patient adherence can only improve to 100 percent. Thus, any intervention that is successful within a population, such as this one, will likely see its largest improvements initially.

Study Results

As shown in Exhibit 1, members of the intervention and control groups had a comparable average age. The majority of patients were female (57 percent of the intervention group and 55 percent of the control group). Commercial plans were the most common health insurance for both groups, with Medicare Advantage covering 40 percent of both groups and Medicaid covering approximately 15 percent. Patients in both study groups had the same proportion of insurance types. In both groups, RASA was the most common medication, while oral medications for diabetes were least common. For a chart including percentage numbers and standard deviations, see online Appendix Exhibit 2.[25]

ADHERENCE ANALYSIS Mean adherence rates for the five medication classes were lower or almost equal in the intervention group compared to the control group before starting the intervention (Exhibit 2). This finding was reversed during the intervention period, in which the mean adherence rates for the five medication classes increased among the intervention group as compared to the control group.

After adjustment for the propensity scores, all control-variable means were balanced with standardized differences less than 10 across the study groups.[32] This indicates that the propensity score

EXHIBIT 1

Characteristics Of Patients In The Pennsylvania Project Study, By Study Group, January–December 2011

Characteristic	Intervention group (*N*=29,042)	Control group (*N*=30,454)
Mean age (years)	59	60
Female	16,554	16,806
INSURANCE TYPE[a]		
Commercial	12,778	14,162
Medicare Advantage	11,617	11,915
Medicaid	4,647	4,714
MEDICATION CLASS		
Calcium channel blockers	8,503	8,699
Oral diabetes medications	7,076	6,266
Beta-blockers	15,635	15,620
Statins	15,654	16,147
Renin angiotensin system antagonists	17,632	18,573
DURING THE TWELVE MONTHS PRIOR TO THE INTERVENTION		
Diagnosis		
Hypertension	23,115	25,192
Dyslipidemia	21,223	22,905
Diabetes	8,958	9,361
Health care costs		
Mean	$11,359	$11,468
Median	$5,263	$5,332
Number of patients with any ED visits	13,887	14,947
Number of patients with any inpatient ED stays	9,519	10,230

SOURCE Authors' analysis of data from the Pennsylvania Project. **NOTES** Health care costs are in 2011 US dollars. Mean differences for all variables were significant at the 0.01 level except health care costs (mean: $p < 0.43$, median: $p < 0.28$). The significant results were realized because of the study's large sample sizes, which is the reason why a visual examination of the means did not appear to demonstrate differences between groups. A version of this exhibit, which includes standard deviation and percentage numbers, can be found in the online Appendix (see Note 25 in text). Average health care costs by study group and health care domain are included in online Appendix Exhibit 1. ED is emergency department. [a]When the three insurance types for the control group are added together, they total more than what appears under *N*. This is because they are not mutually exclusive groups. A small number of people have multiple insurance payers.

EXHIBIT 2

Mean Adherence Rate (Proportion Of Days Covered Of 80 Percent Or Greater), By Medication Class, With Intervention Timing For 330 Days, In Intervention And Control Groups, 2010–11

	Intervention group		Control group	
Medication class	**Before**	**During**	**Before**	**During**
Calcium channel blockers	65%	70%	66%	65%
Oral diabetes medications	61	63	63	59
Beta-blockers	63	68	65	64
Statins	66	73	68	70
RASA	66	72	66	65

SOURCE Authors' analysis of data from the Pennsylvania Project. **NOTES** "Before" denotes preintervention values (January 1–December 31, 2010). "During" denotes values during the intervention (January 1–December 31, 2011). All *p* values are significant at the 0.01 level, except the following, which are significant at the 0.05 level: calcium channel blockers, before, intervention vs. control; calcium channel blockers, control, before vs. during; beta blockers, control, before vs. during; renin angiotensin system antagonists (RASA), control, before vs. during.

model sufficiently balanced any differences between the intervention and control groups. Exhibit 3 reports the conservative doubly robust estimates of the intervention effect on the adherence rate (PDC80) for the five medication classes. For all medication classes, the intervention had a positive effect on adherence, and all findings were statistically significant.

Our sensitivity analyses indicate that our findings are robust. Replicating estimates for a reduced sample of patients with a longer observation period did not change the overlap in propensity scores, nor did it reduce their balancing influence. Further, all effects of the intervention in the reduced sample were still positive and statistically significant. Moreover, changes in adherence aggregated across all medication classes were significantly improved for the intervention pharmacies compared with the control pharmacies.

In both groups, low-risk patients with a PDC above 80 percent prior to the intervention were very likely to remain at this level at follow-up. In the control group, the number of patients losing their PDC80 status during the study was roughly equivalent to the number of patients who achieved a PDC80 following a non-PDC80 baseline. Approximately 75 percent of the net improvement in PDC80 among the intervention group was attributable to high-risk patients (baseline below PDC80) who achieved PDC80 in the intervention period. The remaining 25 percent occurred because there were more low-risk intervention-group patients maintaining their PDC80 status than comparison-group patients.

HEALTH CARE COST ANALYSIS Exhibit 4 shows the median twelve-month health care costs per patient over time and by intervention group for each medication class. Overall, health care costs were higher in 2011 than 2010. In 2010 the highest median costs were observed for patients using oral diabetes medications. Exhibit 4 also reports the estimated change in health care costs for the intervention patients from the doubly robust model. For intervention patients using oral diabetes medications, annual costs during the intervention period were lower by $341. The intervention-group patients who used statins also saw a $241 decrease in annual costs. The remaining three medication-class samples did not demonstrate significant health care cost reductions compared to the control-group patients.

Results from separate analyses that focused only on inpatient and ED visits demonstrated decreases in costs among patients in the intervention pharmacies, but these reductions were not significantly lower than in the control-pharmacy patient costs. Nonetheless, reductions in inpatient and ED costs represented the majority of the overall health care cost reductions (60 percent of the total costs) observed in the intervention patients. Finally, analyses of monthly and quarterly costs demonstrated that the improvement in health care costs for patients using statins and oral diabetes medications increased steadily over the twelve-month period.

EXHIBIT 3

Doubly Robust Propensity Score Intervention Effect On Medication Adherence Rate (Proportion Of Days Covered Of 80 Percent Or Greater) For At Least 270 Days, By Medication Class, 2010–11

Medication class	**Number of patients**	**Average effect**
Calcium channel blockers	16,626	0.033****
Oral diabetes medications	12,278	0.048***
Beta blockers	30,227	0.031****
Statins	31,030	0.041****
Renin angiotensin system antagonists	35,423	0.037****

SOURCE Authors' analysis of data from the Pennsylvania Project. ***$p < 0.01$ ****$p < 0.001$

EXHIBIT 4

Median Twelve-Month Health Care Costs, By Time Period And Study Group, And Estimated Intervention Effects, 2010–11

	Median 12-month health care costs[a]				Intervention effect estimates from doubly robust propensity score models[d]—average effect
	Intervention group		Control group		
Medication class	Before[b]	During[c]	Before[b]	During[c]	
Calcium channel blockers	$4,824	$5,281	$5,055	$5,431	21
Oral diabetes medications	6,442	6,401	6,617	6,896	−341***
Beta-blockers	5,287	5,760	5,376	5,799	−19
Statins	5,293	5,616	5,259	5,782	−241**
Renin angiotensin system antagonists	5,423	5,661	5,679	5,973	−91

SOURCE Authors' analysis of data from the Pennsylvania Project. [a]Health care costs (in 2010 and 2011 dollars) were the sum of all allowable charges reported by the payers for all health care use reported for each patient; average effect refers to a dollar amount, and a minus sign indicates that costs were lower. [b]Preintervention ("before") costs were summed from January 1 to December 31, 2010. [c]Costs during the intervention period occurred January 1 to December 31, 2011. [d]Doubly robust models included age; female sex; insurance indicators; and preintervention proportion of days covered in the relevant medication class, total health care costs, and indicators of diagnoses for hypertension, dyslipidemia, and diabetes. Costs were modeled using the gamma family of distributions with a log linking function. After propensity score adjustment, differences between the study groups in the prevalence of health care use and costs during the preintervention period were minor (standardized differences less than 5; conventions recommend that differences need to be less than 10). For more details, see the online Appendix (see Note 25 in text). Mean health care costs by study group and health care domain are in online Appendix Exhibit 1, including a discussion of how they correspond to these model results. Outpatient care was the most common type of service but represented 48 percent of total costs. Pharmacy costs represented 12 percent of costs. The remainder of costs were divided among emergency care (27 percent) and inpatient care (11 percent). Significance denotes different effects from 0. **$p < 0.05$ ***$p < 0.01$

Discussion

CHRONIC DISEASE AND MEDICATION ADHERENCE This project targets several salient considerations in the changing US health care landscape. Chronic diseases such as diabetes and cardiovascular disease are a primary driver of health care costs, mortality, and quality of life.[33–35] Yet a large number of patients with these chronic diseases have poor medication adherence,[36–38] and this has been demonstrated as an important mediator in adverse patient and cost outcomes.[39]

ROBUST IMPROVEMENTS IN ADHERENCE The most significant evidence of the intervention's successful implementation is the consistent improvement in adherence for all five classes of medication analyzed. Additional evidence is the robustness of the improved adherence to patient variations (such as statin users versus users of oral diabetes medication) and sustained improvements across the study period (ranging from 180 to 330 days). Though it cannot be concluded what the effect of the cloud-based performance reports was on the study results, there was an insignificant correlation between pharmacies' adherence performance with the number of performance report views. Furthermore, the use of similar performance assessment systems has been documented as important to supporting care quality improvement.[40] Thus, it is suggested that pharmacy organizations that wish to implement the screening and brief intervention approach might also wish to use a performance assessment system such as was used in this study to support their efforts.

$1.4 million

Savings

For a payer with 10,000 members, the improvement in health care spending demonstrated in this intervention could translate to savings of $1.4 million for a one-year period.

POTENTIAL EFFECTS ON HEALTH CARE COSTS AND PUBLIC POLICY Using adherence estimates from this study, for a payer with 10,000 members who are taking statins only (35 percent) or antidiabetes medications only (10 percent) or both (10 percent), the improvement in health care spending demonstrated through this intervention could translate to savings of $1.4 million for a one-year period. Our estimate was produced by multiplying the expected per member per month costs from this study for these two disease states ($20 and $28, respectively) by the expected numbers of patients with the diseases and by 12. Moreover, if a payer had exclusively contracted with the intervention group pharmacies, its Medicare star rating would have increased by one star.[4,41] For a Medicare Advantage plan with one million patients, this increase of one star could translate to about $100 million in additional revenue.[42] Thus, the intervention has implications for payers that are selecting pharmacy networks with the best patient medication adherence rates in order to reduce health care spending and to optimize performance measures used in the Medicare Star Rating System.

SCALABILITY The Pennsylvania Project was implemented under real-world conditions with very limited funding to the community pharmacy organization. Though the direct pharmacy costs were not calculated, the intervention was stably integrated into a standard pharmacy workflow process without requiring additional staffing and affecting normal pharmacy operations (for example, immunization rates among the inter-

The Pennsylvania Project was implemented under real-world conditions with very limited funding to the community pharmacy organization.

vention and control pharmacies were similar). Thus, this strategy could likely be scaled to many community pharmacy practices.

The intervention pharmacies saw an increase in prescription volume of 900 pills per 1,000 patients for the index medications. Since overall medication adherence across all medication classes was improved, we estimated that an increase of 900 pills per 1,000 patients would be seen in each medication class by six months post-implementation. This additional prescription volume would provide additional revenue to support the intervention's implementation and sustainability. In addition, the intervention could be enhanced to include additional interventions (such as medication therapy management sessions) for patients with the highest nonadherence risk and additional screenings that would likely further improve the impact of the screening and brief intervention on population adherence. Application of the screening and brief intervention model could be funded through changes in payment structures between payers and community pharmacies as payers realize additional revenues from the Medicare Star Rating System.[1] Finally, future studies could also examine the impact of this interventional strategy applied concurrently by pharmacists, physicians, and other allied health care providers among shared patient populations such as with accountable care organizations (ACOs). Indeed, CMS's ACO performance metrics include improved patient medication adherence.[43]

Conclusion

The screening and brief intervention process demonstrated in the Pennsylvania Project significantly improved medication adherence across five major chronic disease medication classes. Moreover, this intervention resulted in significantly decreased health care spending. If applied to other community pharmacy settings, the intervention is scalable and would likely result in improved medication adherence across patient populations. For payers, it would also result in decreased costs and increased revenues (for example, via decreased downstream health care spending and improved Medicare star ratings). Ultimately, the increased revenue that payers would realize from improved Medicare star ratings and decreased health care spending could be used to provide incentives to pharmacy organizations to implement and expand upon this intervention. ■

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