

# Collaborative DTM Reduces Hospitalization and Healthcare Costs in Patients With Diabetes Treated With Polypharmacy

Lauren Brophy, PharmD, FAHM; Amanda Williams, PharmD; Eric J. Berman, DO, MS; David Keleti, PhD; Karen E. Michael, RN, MSN, MBA; Margaret Shepherd, RPh, FAHM; Scott A. Fox, MS, MEd; Christine Jacobs, MA; Susan Tan-Torres, MD, MPH; Andrea D. Gelzer, MD; and Mesfin Tegenu, MS, RPh

**Objectives:** To evaluate the effects of a collaborative pharmacy benefits manager (PBM)/health plan-administered drug therapy management (DTM) program on healthcare utilization and costs in patients with diabetes treated with polypharmacy.

**Study Design:** Retrospective quasi-experimental design with comparison group.

**Methods:** This DTM program was a collaborative effort between the PBM, PerformRx, and the care management departments of Keystone First (KF) and AmeriHealth Caritas Pennsylvania (ACP) care management departments, targeting patients with diabetes using  $\geq 15$  medications. Pharmacists reviewed member profiles and made evidence-based prescriber and patient interventions, working directly with prescribers and indirectly with members, via care managers. Care managers provided additional services not otherwise within the scope of DTM. The study group consisted of 954 DTM participants reviewed by a pharmacist between November 1, 2010, and July 31, 2011. The control group consisted of 810 matched DTM participants not reviewed by a pharmacist.

**Results:** Intervention acceptance rates for KF and ACP were 33% and 26%, respectively. The study group demonstrated lower inpatient admissions and emergency department utilization rates, although only the KF study group inpatient admission rate achieved statistical significance (76.4%;  $P = .0002$ ). The study groups realized statistically significant total cost savings (pharmacy + medical) compared with their corresponding control groups (47.8% KF,  $P = .0039$ ; 50.7% ACP,  $P = .0497$ ) despite non-statistically significant increases in pharmacy costs.

**Conclusions:** A collaborative pharmacist-driven DTM program with a care manager-executed patient outreach component results in reduced hospital utilization and significant healthcare cost savings.

*Am J Manag Care. 2014;20(3):e72-e81*

For author information and disclosures, see end of text.

According to the American Pharmacists Association, drug therapy management (DTM) is a service that optimizes therapeutic outcomes by way of pharmaceutical interventions intended to (1) elicit changes in drug regimens; (2) reduce the incidence of adverse drug events; and (3) improve adherence. Formerly an underutilized component of the healthcare team approach to treating patients, implementation of DTM services has been facilitated by a payment framework created by the Medicare Prescription Drug, Improvement, and Modernization Act of 2003.

DTM is frequently a stand-alone service consistent with a traditional, siloed approach to healthcare. Although an integrated approach to healthcare is preferred, DTM as a component of a segmented healthcare system has demonstrated impressive quality improvements and cost savings. The Minnesota Medicaid Medication Therapy Management program realized healthcare cost savings of \$3768 per patient per year between 2006 and 2007.<sup>1</sup> The North Carolina CheckMeds medication therapy management program for more than 15,000 Part D seniors saved an estimated \$13.2 million in healthcare costs in 2010.<sup>2</sup> The Iowa Medicaid Pharmaceutical Case Management program demonstrated a significantly improved mean Medication Appropriateness Index score among participants compared with baseline ( $P < .001$ ) over a 9-month period between 2000 and 2001.<sup>3</sup> Managed care organizations (MCOs), occasionally employing pharmacy benefits managers (PBMs),<sup>4</sup> have also increasingly incorporated DTM services into benefit offerings, demonstrating positive outcomes.<sup>5,6</sup> While DTM service providers are primarily pharmacists, a pharmacist is not a prerequisite for a DTM program. In fact, in 10% of 2012 Medicare Part D programs, a case manager provided DTM-type services.<sup>4</sup>

Not all patients, however, benefit from DTM services, and intervention should focus on those at highest risk. Comorbidities such as cardiovascular disease, hypertension, and nephropathy<sup>7</sup> frequently accompany a diagnosis of diabetes, and patients with multiple comorbidities are often managed with polypharmacy. Polypharmacy increases the risk of medication-related problems (MRPs), reducing population health and driving up health-

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care costs, a problem complicated by the prescription of more medications than clinically warranted. Polypharmacy also promotes suboptimal adherence,<sup>8</sup> resulting in underutilization of preventative, lower-cost primary care services and overutilization of higher-cost emergency department (ED) services.<sup>9,10</sup> Thus, despite lower medication-related costs from low adherence and reduced pharmacy utilization, costs are transferred to the medical sphere via less effective emergency care, thereby increasing overall healthcare costs.

DTM is a valuable service proven to improve healthcare quality and reduce costs. Various DTM delivery models exist. A literature search revealed a lack of DTM programs that incorporate a care manager in addition to a pharmacist (see [Table S1](#) in [Appendix](#)). The value of DTM services may be enhanced with an integrated approach that includes a care manager. This study was designed to evaluate the effects of a PBM/health plan–administered, collaborative DTM program that incorporates both a pharmacist and a care manager targeted to high-risk patients with diabetes treated with polypharmacy. We were primarily interested in determining whether the DTM program would reduce medical utilization and total costs (pharmacy + medical). We hypothesized that DTM intervention would reduce medical utilization, as measured by ED visits and inpatient admissions, and generate total cost savings, despite a predicted increase in pharmacy costs.

## METHODS

### Population and Study Design

PerformRx, the fully owned PBM of AmeriHealth Caritas Family of Companies (ACFC), serves just under 3 million health plan members. Partnering Medicaid MCOs and fully owned ACFC subsidiaries Keystone First (KF) and AmeriHealth Caritas Pennsylvania (ACP) serve about 290,000 and just over 126,000 members, respectively, as of January 2014. These 3 entities jointly developed a collaborative, Utilization Review Accreditation Commission–accredited DTM program to improve member care. PerformRx was responsible for the pharmacy-based management component of the DTM program. KF and ACP supplied the DTM program participants and executed the care management (CM) component.

This retrospective study was designed as a quasi-experiment with comparison group. The targeted participants were patients with diabetes (*International Classification of Diseases, Ninth Revision*, codes for diabetes [250.xx] or 1 diabetes medication within the previous year) being treated with polypharmacy (unique generic code number count of  $\geq 15$ ). This patient population

### Take-Away Points

- A collaborative drug therapy management (DTM) program with modest acceptance rates effectively reduces inpatient admissions and generates significant cost savings.
- Overall acceptance rates for pharmacist-recommended DTM interventions are likely to range from 26% to 33%.
- Hospital utilization can be substantially reduced in a successful DTM program.
- Pharmacy-related costs would be expected to increase with the implementation of a successful DTM program but are outweighed by medical cost savings.

was selected because the likelihood of comorbidities with diabetes and polypharmacotherapy put these patients at high risk for MRPs and nonadherence.<sup>9</sup>

The study population analyzed consisted of 954 DTM participants (n = 690 KF, n = 264 ACP) reviewed by a pharmacist for DTM services. The matched control group consisted of 810 DTM participants (n = 600 KF, n = 210 ACP) not reviewed by a pharmacist for DTM services, but who may have received autonomous CM services. The baseline period (November 1, 2009–October 31, 2010) was followed by a 1-year measurement period (November 1, 2010–October 31, 2011). Members enrolled in the plan for less than 6 months during baseline or measurement periods were excluded. Additionally, members reviewed by a pharmacist in the final 3 months of the measurement period (August 1, 2011–October 31, 2011) were excluded because recommendations made during that time would not have had the standard 3-month time frame allowed for follow-up and outcome determination. Analysis was performed 6 months postmeasurement, allowing sufficient lag time to receive medical claims.

Relative risk scores quantify financial implications of morbidity based on prior healthcare utilization.<sup>11</sup> Prospective risk scores were assigned to participants based on previous claims, gender, and age, and used to randomly select a comparison group with a comparable risk score. Since risk scores are continuous variables, 1:1 matching of study-to-control group risk scores was impossible. Therefore, we applied stratified random sampling of risk scoring from the 10th percentiles of the study group as strata. Cutoff points for these 10th percentiles were applied to the control groups to create 10 strata. An equal number of cases from each of the 10 strata was randomly selected, generating a comparable distribution of risk scores in control and study groups. The comparability of these groups was validated with an independent, 2-sample *t* test.

### Implementation Process

The DTM process flow is displayed in [Figure S1](#) (available in [Appendix](#)). DTM pharmacists reviewed adherence, gaps in care (GICs), and First DataBank (FDB) clinical decision-support modules, and prepared prescriber and

member interventions. Adherence was assessed for both short-term (eg, member overdue refilling medication) and long-term (eg, member frequently misses doses over an extended time frame) issues. Interventions to improve adherence included recommendations to simplify regimens and reduce side effects and drug interactions.<sup>12</sup> GICs are proprietary algorithms that identify when members have not met standard-of-care guidelines (eg, diabetic not self-monitoring blood glucose [SMBG]). FDB modules identify safety concerns such as drug interactions, duplicate therapies, and improper dosing.

Pharmacists provided evidence-based recommendations directly to prescribers and indirectly to members via care managers, referring to a list of medications considered "urgent," jointly compiled by PerformRx and KF/ACP. Urgent interventions directed to prescribers received a phone call in addition to the standard letter/fax, and those directed to members received expedited care manager outreach within 1 day compared with the standard 20 days. KF and ACP employ the same style of CM—a blended model of CM and disease management managed by a single care manager. Care managers provided additional services not otherwise within the scope of DTM, such as health coaching, education, transportation assistance, and prescription refill/transfer/authorization assistance. Members actively engaged in CM were counseled by their respective care managers, thereby leveraging existing care manager–member relationships and streamlining contact efforts. Members not actively engaged in CM were counseled by an urgent response care manager, thereby expanding available resources to include CM services. DTM pharmacists were available to assist care managers with counseling.

After 20 days from the date a member intervention was identified, and 90 days from the date a prescriber intervention was identified, the pharmacist and technician, respectively, followed up to determine the outcome of the outreach. Pharmacists reviewed care manager outreach notes and technicians reviewed claims data to determine outcomes. Outcomes were flagged as Accepted, Not Accepted, Rejected, Unknown, or Not Applicable. In the event a recommendation to add or change therapy was accepted, the pharmacist conducted an additional review for medication appropriateness and adherence and tasked a member outreach to the care manager to assess efficacy and side effects.

### Statistical Analysis

Dependent variables examined to demonstrate the effectiveness of the DTM program included number of ED visits and inpatient admissions per 1000 members, as well as per member per month (PMPM) pharmacy, medical, and total costs. These variables were populated with the health plans'

claims data. The independent variable analyzed was percent participation in the DTM program.

Because variations in risk can be important cost and utilization confounders, Diagnostic Cost Group (DxCG, Boston, Massachusetts) models were applied using risk adjustment methodology to establish an empirically valid measure of expected resource use. Mean risk scores for KF study and matched control groups were 695 and 702, respectively. Mean risk scores for ACP study and matched control groups were 660 and 643, respectively (Table 1).

For each member, the dependent variables during baseline and measurement periods were summed separately and divided by the number of member months in the corresponding time period. Healthcare utilization and costs for study and control populations comparing baseline and measurement time periods were evaluated using the non-parametric Wilcoxon signed-rank test, selected because the data were matched pairs and the variables were not normally distributed.

Difference-in-differences (DID) analyses were used to compare program effects on utilization and costs study and control groups. Statistical significance was set at  $\alpha = .05$ . Data manipulation and analysis were performed using SAS EG 5.1 (SAS Institute, Cary, North Carolina).

## RESULTS

### Study Cohorts

The percentages of KF and ACP study group members that received pharmacist intervention were 92.3% and 95%, respectively. Pharmacists reviewed without intervening on a subset of study group subjects who had no MRPs. The control group did not receive pharmacist review. Study, control, and total plan population demographic data are displayed in Table 1. The total number of diabetic members in KF and ACP were 11,372 and 3655, respectively.

The disease burden of the study and control groups was approximately 7-fold greater than the health plan average, as measured by differences in DxCG risk scores. In both plans, females and older members (aged 45-64 and aged 65+ groups) were over-represented in the study and control groups compared with the total plan population. A more aged DTM participant population is consistent with the greater likelihood of polypharmacy at more advanced ages. Racial and ethnic demographics between the 2 plans were distinct and consistent with regional demographics. African Americans were under-represented and multiracial members were over-represented in the study group compared with the control and total plan population in ACP. In KF, mean ages were disparate between study and control groups (53 vs 67 years, respectively), while

**Table 1.** Drug Therapy Management Program Demographics

Demographic Data	Keystone First			AmeriHealth Caritas Pennsylvania		
	Study	Control	Total <sup>a</sup>	Study	Control	Total <sup>a</sup>
Members (N)	690 <sup>b</sup>	600	—	264	210	—
Mean DxCG risk score	695	702	100	660	643	100
<b>Gender</b>						
Female, %	65.6	64.0	55.4	70.5	73.8	55.9
Male, %	34.4	36.0	44.6	29.5	26.2	44.1
<b>Race<sup>c</sup></b>						
African American, %	49.1	55.7	52.0	6.4	12.9	11.3
Asian, %	3.5	4.2	5.0	0.8	1.4	1.6
Caucasian, %	36.6	32.8	31.3	51.1	51.4	52.7
Multiracial, %	10.6	7.3	11.4	41.7	33.3	34.2
Other, %	0.3	0	0.2	0	1.0	0.3
<b>Ethnicity</b>						
Hispanic, %	9.3	6.5	9.6	48.9	41.9	42.1
Non-Hispanic, %	90.7	93.5	90.4	51.1	58.1	57.9
<b>Age</b>						
Age <21, %	1.2	0.8	64.8	1.1	1.0	65.8
21-44 y, %	14.5	15.3	22.2	12.5	18.1	23.4
45-64 y, %	76.1	75.3	12.3	79.2	68.1	10.2
65+ y, %	8.3	8.5	0.9	7.2	12.9	0.6
Mean, y	53	67	—	53	52	—
Median, y	54	55	—	54	52	—

DxCG indicates Diagnostic Cost Group.

<sup>a</sup>Total = Total Plan Population.

<sup>b</sup>n = 689 (1 member did not have a risk score assigned).

<sup>c</sup>“Total” columns for Keystone First and AmeriHealth Caritas Pennsylvania do not add up to exactly 100% due to rounding phenomena.

the median ages were similar (54 vs 55 years, respectively; Table 1).

**Acceptance Rates**

Interventions were classified by type (Figure S2 in Appendix); the top 3 intervention types and their proportion of all recommendations are: maintenance medication non-adherence (eg, statins): 37% to 41%; suboptimal therapy (eg, GICs): 21% to 22%; lack of medication monitoring/self-monitoring (eg, SMBG): 14% to 16%.

Acceptance rates for diabetes-specific interventions for KF and ACP were 33% and 26%, respectively. SMBG and medication adherence recommendations had higher acceptance rates (38%-54% KF, 29%-57% ACP) than recommendations for drug-drug interactions (33% KF, 18% ACP) or addition of medications (12%-13% KF, 10%-11% ACP).

**Utilization Rates**

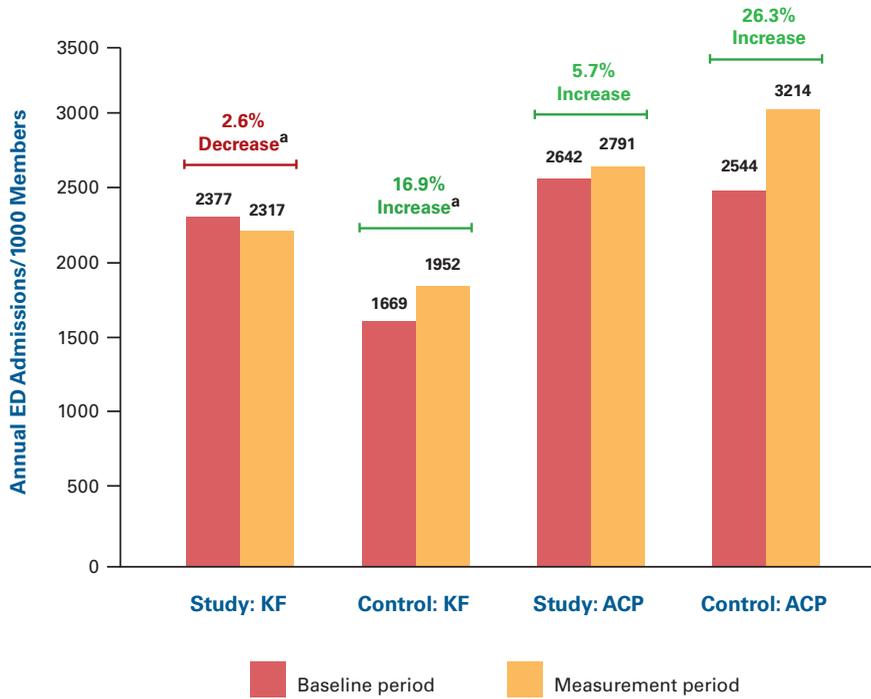
To demonstrate the effectiveness of the DTM program

in limiting MRPs for study group participants, hospital utilization—reflected in the number of ED visits and inpatient admissions per 1000 members—was assessed and reported in Figures 1 and 2, respectively. The differences between measurement period visits/admissions and baseline period visits/admissions were compared.

In both plans, a statistically significant increase in ED visits was observed in the control group (16.9% KF,  $P = .0298$ ; 26.3% ACP,  $P = .0107$ ); however, the changes observed in the study group were not statistically significant (−2.6% KF,  $P = .7797$ ; 5.7% ACP,  $P = .4883$ ; Figure 1). DID analysis revealed that the reductions in ED visits at 19.5% ( $n = 343$ ;  $P = .3632$ ) for KF and 20.6% ( $n = 521$ ;  $P = .5728$ ) for ACP were not statistically significant (Table 2).

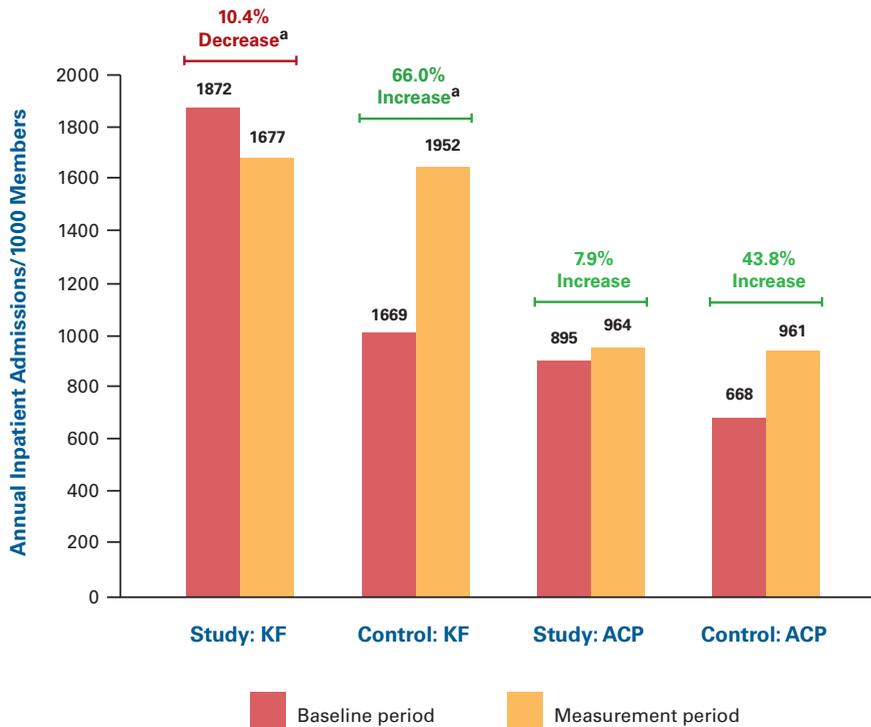
A statistically significant increase in KF inpatient admissions was observed in the control group (66.0%;  $P < .0001$ ), while a statistically significant decrease was observed in the study group (−10.4%,  $P = .0008$ ; Figure 2). An increase in ACP inpatient admissions was observed in both the control

■ **Figure 1.** Emergency Department Visits in Study Versus Control Group



ACP indicates AmeriHealth Caritas Pennsylvania; DID, difference-in-differences; ED, emergency department; KF, Keystone First. At baseline period (Nov 2009-Oct 2010) and measurement period (Nov 2010-Oct 2011) in KF and ACP health plans. The rate differential between baseline and measurement periods (expressed as a percentage above the corresponding bars) was determined using DID calculations. <sup>a</sup>denotes statistical significance.

■ **Figure 2.** Inpatient Admissions in Study Versus Control Group



ACP indicates AmeriHealth Caritas Pennsylvania; DID, difference-in-differences; KF, Keystone First. At baseline period (Nov 2009-Oct 2010) and measurement period (Nov 2010-Oct 2011) in KF and ACP health plans. The rate differential between baseline and measurement periods (expressed as a percentage above the corresponding bars) was determined using DID calculations. <sup>a</sup> denotes statistical significance.

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and study groups (43.8% and 7.9%, respectively), although neither value achieved statistical significance ( $P = .4710$  and  $P = .4196$ , respectively). DID analysis revealed that the reduction in inpatient admissions for KF was statistically significant at 76.4% ( $n = 856$ ;  $P = .0002$ ), but not statistically significant for ACP at 35.9% ( $n = 222$ ;  $P = .4148$ ; Table 2).

### Pharmacy and Medical Costs

To determine the effectiveness of the DTM program in controlling study group costs, PMPM pharmacy, medical, and total costs were compared (Figure 3). Pharmacy costs increased significantly in the control group (19.9% KF, 25.0% ACP; both  $P < .0001$ ) and in the study group (10.1% KF,  $P < .0001$ ; 8.1% ACP,  $P = .0155$ ). From 2010 to 2011, average pharmacy costs PMPM for KF and ACP increased by 14.1% and 12.4%, respectively. However, DID analysis revealed that pharmacy cost increases were not statistically significant (9.8% KF,  $P = .8780$ ; 16.9% ACP,  $P = .4151$ ; Table 2).

Medical costs increased significantly in the control group (67.4% KF,  $P < .0001$ ; 75.4% ACP,  $P = .0016$ ), but not the study group (1.6% KF,  $P = .1740$ ; 1.6% ACP,  $P = .1797$ ). From 2010 to 2011, average medical costs PMPM for KF and ACP increased by 4.6% and 0.7%, respectively. When comparing the differentials between study and control groups, the reduction in medical costs for KF was statistically significant (65.8%;  $P = .0031$ ), but not statistically significant for ACP (73.8%;  $P = .0612$ ; Table 2).

Total costs increased significantly in the control group (52.0% KF,  $P < .0001$ ; 55.1% ACP,  $P < .0001$ ), but not the study group (4.2% KF,  $P = .9859$ ; 4.4% ACP,  $P = .3785$ ). From 2010 to 2011, average total costs PMPM for KF and ACP increased by 6.6% and 9.4%, respectively. According to the DID analysis, the reductions in total costs for KF (47.8%;  $P = .0039$ ) and ACP (50.7%;  $P = .0497$ ) were statistically significant (Table 2).

## DISCUSSION

Managing healthcare costs while maintaining a high level of patient care is a national priority. An estimated \$289 billion is spent annually on drug-related morbidity (13% of total healthcare expenditures), primarily resulting from poor medication adherence, suboptimal prescribing, incorrect drug administration, and inaccurate diagnosis.<sup>13</sup> The use of pharmacists and care managers as part of a health plan-administered DTM program can help to prevent and correct MRPs, reduce medical utilization, and decrease total costs.

We successfully implemented a pilot DTM program in members with diabetes treated with polypharmacy resulting in reduced hospital utilization at substantial cost savings for 2

**Table 2.** Difference-in-Differences Analysis of Utilization and Cost Claim Data

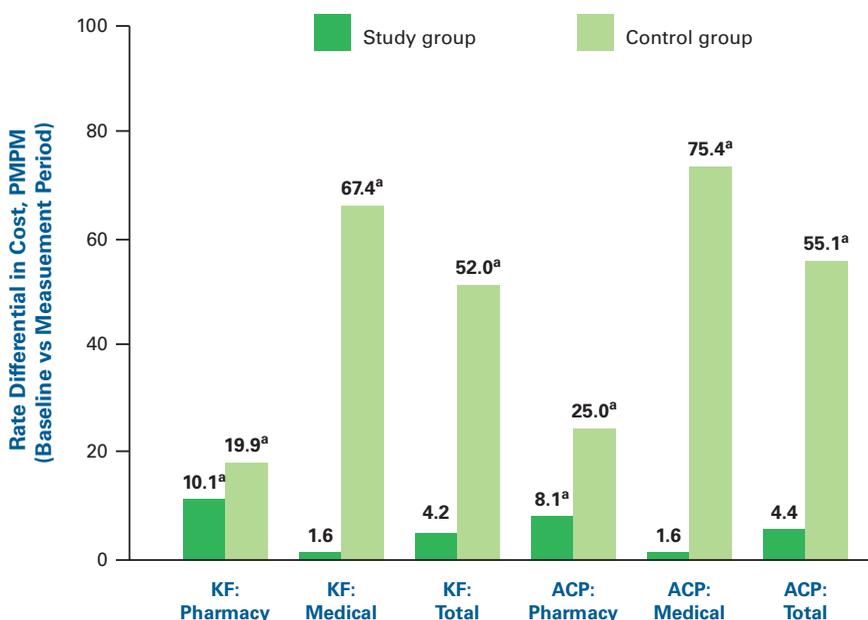
	DID <sup>a</sup>	P
<b>Keystone First</b>		
Emergency department visits	-.02933	.3632
Inpatient visits	-.07298	<b>.0002</b>
Claims (excluding pharmacy)	-833.49124	<b>.0031</b>
Claims (total)	-844.90657	<b>.0039</b>
Pharmacy	-11.4153	.8780
<b>AmeriHealth Caritas Pennsylvania</b>		
Emergency department visits	-.03531	.5728
Inpatient visits	-.01444	.4148
Claims (excluding pharmacy)	-588.9919	.0612
Claims (total)	-661.6647	<b>.0497</b>
Pharmacy	-72.6728	.4151
<small>DID indicates difference-in-differences.            Bold-faced type denotes statistical significance (<math>P &lt; .05</math>).  <sup>a</sup>Regional Policy – Inforegio. <i>Difference-in-differences</i>. Last update: 01/12/2009.</small>		

health plans. The program was comparably effective in 2 disparate populations with high illness burdens. African Americans were over-represented in the urban KF population, while Hispanics and multiracial members were over-represented in the rural ACP population, compared with the national average.

Adherence and self-monitoring recommendations accounted for over 50% of all DTM interventions while also demonstrating the highest acceptance rates. We speculate that higher acceptance rates were achieved because these intervention types involved both prescriber-directed pharmacist outreach and patient-directed care manager outreach. Although not statistically confirmed, the duality of this approach likely increased the recommendation acceptance rate. By contrast, recommendations that were solely prescriber-directed, such as additional therapy recommendations, demonstrated lower acceptance rates.

Despite statistically significant total cost savings in both health plans, only inpatient utilization in the KF study group was reduced in a statistically significant manner. A number of reasons may account for this discrepancy, particularly the selection criteria. In line with ACFC's goal to improve member health, members with diabetes were reviewed in order of degree of healthcare utilization. The study group, therefore, contained more high utilizers compared with the control group. Matched control subjects were later selected based upon comparative risk assessments, which have their own inherent limitations. Therefore, based on the statistically significant total cost savings in both plans, we surmise that the actual utilization benefits of the DTM program were greater than those reflected by the data.

■ **Figure 3.** Pharmacy, Medical, and Total Cost Comparison of Study Versus Control Group



ACP indicates AmeriHealth Caritas Pennsylvania; KF, Keystone First; PMPM, per member per month. At baseline period (Nov 2009-Oct 2010) and measurement period (Nov 2010-Oct 2011) in KF and ACP health plans. The rate differential between baseline and measurement periods (expressed as percentage change above the corresponding bars) was determined using DID calculations. <sup>a</sup>denotes statistical significance.

Interestingly, pharmacy cost escalation was observed in the control group as well as in the study populations. We suspect that most clinicians were unaware whether their patients were nonadherent or poorly adherent, so when the patient’s diabetes was not controlled on maintenance medication (ie, metformin), the physician switched to, or added, a more expensive medication (eg, TZD), thereby increasing the cost for the control groups.

Several additional limitations are apparent in this study. First, the impact of intervention on patients who were fully or partially engaged in CM versus those not engaged in CM was not determined. Members not fully engaged in CM may be less receptive to DTM intervention and may have demonstrated lower acceptance rates in a subgroup analysis. In the KF cohort, 43% of the study group was actively care managed at some point during the measurement period compared with only 35% of the control group. In the ACP cohort, the corresponding values were 31% and 25%, respectively. Additionally, the impact of the DTM program on quality outcomes, such as Healthcare Effectiveness Data and Information Set (HEDIS) measures, was not determined (limitations that will be addressed in future studies). Finally, because total costs were calculated by summing only ED visits, inpatient admissions, primary care provider visits, and specialist visits, they are not a comprehensive total of medical costs. This calculation excludes the cost of medications associated with a proce-

dures, laboratory and durable medical equipment claims data, out-of-pocket costs, and costs to the behavioral health MCO (if present; ACFC is not privy to this information, so is unable to account for it in statistical analysis).

## CONCLUSION

The ACFC DTM program is a collaborative initiative integrating DTM services into existing CM programs. This pilot study demonstrated positive outcomes in both utilization rates and healthcare costs. First, the KF study group demonstrated a statistically significant reduction in inpatient admissions compared to the control group; the reduction observed in ACP participants was not statistically significant. Comparative outcomes for ED utilization were less dramatic and not statistically significant for either plan. Second, optimizing medication regimens for study group participants generated statistically significant reductions in total healthcare costs compared with the control group in both plans. Thus, a collaborative DTM program can be a successful component of managed care benefit offerings and contribute to achieving the goal of providing better care and superior quality at a lower cost.

### Acknowledgments

The authors wish to thank Evan Johnstone, Taryn Robinson, and Ellan Baumgartner for their contributions in the development of this manuscript and the Pennsylvania Department of Welfare for its continuing support.

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**Author Affiliations:** PerformRx, Philadelphia, PA 19113 (LB, AW, MS, MT); The AmeriHealth Caritas Family of Companies, Philadelphia, PA 19113 (EJB, DK, KEM, SF, CJ, STT, ADG).

**Source of Funding:** Work on this manuscript was supported by PerformRx and the AmeriHealth Caritas Family of Companies.

**Author Disclosures:** Drs Brophy and Williams, Ms Shepherd and Ms Tegenu report employment with PerformRx. Drs Berman, Keleti, Tan-Torres, and Gelzer, Ms Michael, and Ms Jacobs report employment with AmeriHealth Caritas Family of Companies. PerformRx and AmeriHealth Caritas funded this study.

**Authorship Information:** Concept and design (LB, AW, EJB, KEM, MS, SAF, ST-T, ADG); acquisition of data (SAF, ST-T); analysis and interpretation of data (LB, EJB, SAF, CJ, ST-T, ADG); drafting of the manuscript (LB, DK, KEM, ADG); critical revision of the manuscript for important intellectual content (LB, AW, EJB, DK, KEM, SAF, CJ, ST-T); statistical analysis (SAF, CJ, ST-T); provision of study materials or patients (LB); obtaining funding (MS, MT); administrative, technical, or logistic support (LB, AW, EJB, DK, MS, MT); supervision (LB, EJB, KEM, MS, ADG, MT).

**Address correspondence to:** Lauren Brophy, PharmD, FAHM, PerformRx, 200 Stevens Dr, Philadelphia, PA 19113. E-mail: Lauren.Brophy@performrx.com.

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Appendix. Search Criteria

■ **Table S1.** Literature Search Criteria of DTM Programs

<b>1. Database:</b> PubMed (NCBI)	<b>2. Database:</b> PubMed (NCBI)
<b>Date of Search:</b> 5/16/2013	<b>Date of Search:</b> 5/16/2013
<b>Search Terms:</b> drug therapy management [Title]	<b>Search Terms:</b> medication therapy management [Title]
<b>No. articles retrieved:</b> 35	<b>No. articles retrieved:</b> 185
<b>No. articles reviewed (AW):</b> 6	<b>No. articles reviewed (AW):</b> 11
<b>No. relevant articles:</b> 0	<b>No. relevant articles:</b> 0 <sup>a</sup>
<b>3. Database:</b> PubMed (NCBI)	<b>4. Database:</b> PubMed (NCBI)
<b>Date of Search:</b> 5/16/2013	<b>Date of Search:</b> 5/16/2013
<b>Search Terms:</b> ((pharmacy benefits manager [Title]) OR health plan [Title]) AND medication therapy management [Title]	<b>Search Terms:</b> (telephone [Title/Abstract]) AND medication therapy management [Title/Abstract]
<b>No. articles retrieved:</b> 2	<b>No. articles retrieved:</b> 19
<b>No. articles reviewed (AW):</b> 2	<b>No. articles reviewed (AW):</b> 8
<b>No. relevant articles:</b> 0	<b>No. relevant articles:</b> 0 <sup>a</sup>

AW indicates Amanda Williams (coauthor); CM, care management; DTM, drug therapy management; NCBI, National Center for Biotechnology Information.  
<sup>a</sup>Two potentially relevant DTM studies were retrieved [References 5 and 6], but neither employed a CM.

■ **Figure S1.** The DTM Process

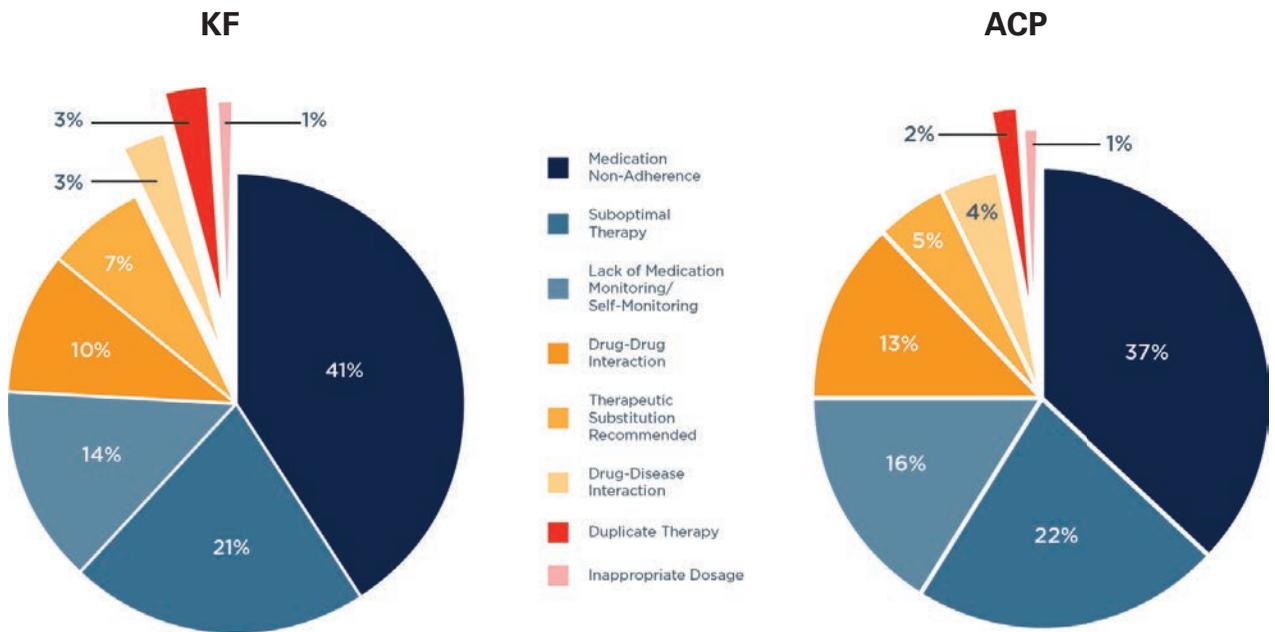
See Methods section (Implementation Process) for details.

**Process Flow**



■ **Figure S2.** Medication-Related Problems Addressed

**Acceptance Rates**



ACP indicates AmeriHealth Caritas Pennsylvania; DTM, drug therapy management; KF, Keystone First. In both plans, the top 3 categories (in descending order of frequency; categories 1-3) of medication nonadherence (37%-41%), suboptimal therapy (21%-22%), and lack of medication monitoring/self-monitoring (37%-41%) account for three-fourths of the recommended DTM interventions recorded.