Published in final edited form as:

J Pharm Health Serv Res. 2017 March ; 8(1): 59–62. doi:10.1111/jphs.12162.

Outcomes Associated with Pharmacist-Led Diabetes Collaborative Drug Therapy Management in a Medicaid Population

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Abstract

Objectives—Pharmacist-led diabetes collaborative drug therapy management (CDTM) has been shown to improve outcomes. Whether such programs are effective specifically in Medicaid patients, who face barriers to access and self-management, has not been well characterized. This pilot study explores glycemic control, utilization and costs associated with pharmacist-led CDTM in a small population of Medicaid patients with type 2 diabetes mellitus (T2DM).

Methods—A pre-post, historical cohort study was conducted of patients with T2DM and Medicaid coverage who received pharmacist-led CDTM in community-based primary clinics between 2008-2012. Outcomes included change in HbA1c, healthcare costs and utilization.

Results—This study included 79 Medicaid patients with T2DM who received pharmacist-led CDTM. A subset of 46 patients with Medicaid coverage through an affiliated Medicaid Plan, Healthy U, was identified for additional analysis. At 6-months follow-up, HbA1c was a mean (SD) of 2.0% (2.0) lower than the baseline of 10.3% (1.7). Primary care clinic encounters increased by a mean (median) of 3.4 (2) visits. Per patient health system charges increased by a mean (median) of

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Conflicts of Interest. None to report.

\$4,392 (\$620) and the amount paid by Medicaid in the Healthy U subset was \$822 (\$68) higher in the follow-up period.

Conclusion—A pharmacist-led diabetes CDTM intervention was associated with improved glycemic control in Medicaid patients, which corresponded with a higher number of primary care visits and observed costs. These findings are consistent with studies not limited to Medicaid, suggesting that CDTM can be effective in type 2 diabetes patients with Medicaid coverage.

Keywords

Type 2 diabetes; costs; disparity; clinical pharmacy service

Introduction

Pharmacist-led Diabetes Collaborative Drug Therapy Management (CDTM) optimizes drug treatment and has been shown to improve clinical outcomes in primary care settings.^{1,2} CDTM may also have a positive effect on health care utilization and costs.^{1,2} Patients with Medicaid coverage are known to face barriers to accessing care and to disease self-management, and therefore may not experience the same CDTM outcomes as a general population.^{3,4} This pilot study evaluated if a proven primary care-based CDTM intervention is associated with improved glycemic control in Medicaid patients with type 2 diabetes mellitus (T2DM). It also describes health care utilization and costs before and after patients receive CDTM.

Methods

A pre-post, historical cohort study was conducted between January 1, 2008 and December 31, 2012 based on electronic medical record (EMR) and administrative data from the University of Utah Healthcare (UUHC) providers, and claims data from an affiliated Medicaid plan, Healthy U. The study setting was the University of Utah Community Clinics (UUCS). During the study period, pharmacists provided CDTM in 4 UUCS primary care practices with pharmacists working under Collaborative Practice Agreements (CPA) with clinic physicians. CPAs delegate authority to the pharmacist to monitor, prescribe and modify diabetes medication therapy upon referral by the primary care providers. Pharmacists collaborate with the primary care provider to achieve treatment goals, but specific medication management activities are not driven by pre-specified protocols. Thus, the CPAs allow pharmacists to utilize their clinical judgment when making medication changes, including insulin initiation, titration, and dose adjustments for basal, and basal-bolus insulin regimens. PharmD trained pharmacists provided program oversight and coordination. All pharmacists delivering the intervention, were PharmD or BS trained and successfully completed classroom and real time clinical education in diabetes management during program implementation. There were no certified diabetes educators on staff at the time of this analyses.

Referrals were initiated by the primary care provider during a visit or when reviewing patient lab results. In addition, pharmacists could request a CDTM referral after interacting with the patient. During CDTM visits, pharmacist provided disease state education and

counseling, ordered medication changes and/or dose adjustments as required. Referred patients had an initial face-to-face visit with the pharmacist with regular follow-up visits in person or by phone with content and timing based on patient need. Pharmacist-led CDTM continued for each patient until treatment and/or self-management goals were met, at which time the patient returned to usual drug therapy management by their provider.

The study included adult CDTM patients whose hemoglobin A1c (HbA1c) was $\geq 7.0\%$ at their first CDTM encounter (index date). Included patients also had a 6-month follow-up HbA1c value and Medicaid coverage at any time during the study period. A subset with Healthy U enrollment for 30+ days was identified to assess utilization and costs per paid claims data.

The primary study outcome was the change in HbA1c from baseline to 6 months follow-up (± 90 days) in the overall study cohort. Attainment of follow-up HbA1c $< 7.0\%$ was assessed as was HbA1c $\geq 9.0\%$ in patients with baseline HbA1c $\geq 9.0\%$. Exploratory outcomes included costs and utilization pre- and post-index date per UUHC charge data. Cost and utilization data, including health plan costs were also described in the subset of patients with Healthy U data. CDTM program costs were not included.

Descriptive statistics were used to present baseline patient characteristics and glycemic control, cost, and utilization data. A paired t-test was used to compare HbA1c between pre- and post-index date periods for the overall cohort. Because economic data are often skewed, costs and utilization were described using both mean and median values.

Results

Of 305 CDTM patients with baseline HbA1c $\geq 7.0\%$ and a 6-month follow-up HbA1c value, 79 were included in the study. The remaining 226 patients did not have Utah Medicaid coverage during the study period and were not included. Mean (SD) age was 53.2 (12.9) years and mean baseline HbA1c was 10.3% (1.7) (Table 1). In the Healthy U subset (n=46), mean age was 52.5 (14.1) years and mean HbA1c was 10.3% (1.6).

Mean reduction in HbA1c from baseline to follow-up in the overall cohort was -2.0% (2.0) ($p < 0.001$). HbA1c $< 7.0\%$ was attained by 27.9% of patients. While 69.6% of patients had a baseline HbA1c $\geq 9.0\%$, 35.4% had HbA1c $\geq 9.0\%$ at follow-up.

The mean (median) total costs per UUHC charge data was \$4,494 (1,553) in the pre-index period and \$8,887 (2,008) in the post-index date period (Table 2). UUCC visits and other outpatient clinic visits increased during the post-index period by a mean (median) of 3.4 (2) and 4.8 (3) visits, respectively.

In the Healthy U subset, the mean UUHC total charge was \$3,557 (1,656) in the pre-index period and \$9,529 (1,598) in the post-index period. UUCC and other outpatient visits increased by an average of 2.7 (2) and 3.5 (2), respectively. When considering Healthy U claims data, the mean total amount paid to all providers was \$2,509 (1,409) in the pre-index period rising to \$3,331 (1,531) in the post-index period. Prescription drug use increased to 26.6 (20) claims from 22.6 (18) claims pre-index.

Discussion

This study demonstrated that a primary care-based, pharmacist-led diabetes CDTM program designed to optimize diabetes medication use in patients with poorly controlled T2DM is associated with improved glycemic control among Medicaid patients. These results are consistent with other studies that have demonstrated that pharmacist-led, primary care CDTM is associated with improved glycemic control.^{1,2,5} These results are also similar to previous analyses of the overall UUHC CDTM intervention that was not limited by insurance type. A pilot pre-post analysis of N=111 CDTM patients observed a mean HbA1c reduction of 2.0% from a baseline HbA1c of 10.1% ($p<.001$).⁵ A larger comparator study (CDTM n=303) also identified a 2.0% time-adjusted reduction in HbA1c from a similar baseline of 10.3%.¹

CDTM patients also experienced an increases in UUCC and outpatient visits, prescription drug use, health system charges, and health plan costs in the post-index period. Given the small sample size however, these results should be interpreted with caution. The small sample size made the study particularly vulnerable to outliers as evident by the notable difference between the observed mean and median costs. Specifically, 2 patients had inpatient costs that were over 4 standard deviations greater than the mean. By removing these outliers in the overall cohort analysis, the difference in mean UUHC inpatient charges pre to post-index was a reduction of \$242 versus the observed increase of \$2200. Further, the change in mean total costs pre- to post-index date was an increase of \$1980 versus the observed increase of \$4392.

The findings from this study, in light of prior analyses, provide preliminary evidence that CDTM worked generally as well in a Medicaid population as in the overall CDTM population in terms of improving glycemic control. This may reflect the nature of the evaluated program, which allowed the pharmacist to tailor the intervention timing, content, and delivery to best suit patient needs. Findings may also be due in part to selection bias as this study was based on Medicaid patients with poorly controlled T2DM and access to primary care who were willing to engage in CDTM.

The study findings are encouraging in suggesting that health systems can design pharmacist-led CDTM programs that are effective overall and for their Medicaid patients in improving glycemic control. This may be particularly salient to health systems that have accepted risk for outcomes and costs for some or all of their Medicaid population, although a longer term study in a larger cohort is warranted to better assess cost implications.

This pilot study has several limitations in addition to a small size. The cohort was from a limited geographic area that is less diverse than the US overall. Further, this pilot used patients as their own controls in a pre-post study design. While a pre-post design helps to control for differences between comparison groups, it remains possible that the observed association between CDTM and HbA1c reduction was confounded by other factors such other diabetes management activities and lifestyle changes. Finally, the cost of the CDTM program was not included in the cost analysis which may underestimate system costs in the post index-date period.

Conclusion

This pilot study showed that pharmacist-led CDTM was associated with improved glycemic control with higher observed utilization of outpatient services in Medicaid patients with T2DM. Future research will include a larger cohort with a comparison group, and examine outcomes over a longer period of time to provide a more robust assessment of pharmacist-led diabetes CDTM in a Medicaid population.

Acknowledgments

The authors thank Dr. Karen Gunning, PharmD for project input, Mr. Brian Oberg for data management, as well as Josette Dorius, Tracy Smith, Beth Artman, and Kristine Ellerbruch for assistance accessing and evaluating Healthy U claims data.

Funding: This work was supported in part by National Cancer Institute funded training grant (award no. KM1CA156723). The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Cancer Institute or the National Institutes of Health.

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Table 1

Baseline Characteristics for Medicaid Patients with Type 2 Diabetes Receiving Collaborative Drug Therapy Management Overall and for a Subset with Healthy U Coverage

Baseline Characteristic	Total Cohort (N=79)	Healthy U Subset (n=46)
Mean Age Years (SD)	53.2 (12.9)	52.5 (14.1)
Age 65+ (n, %)	16 (20.3)	10 (21.7%)
Male (n, %)	24 (30.4)	17 (37.0)
Race/Ethnicity (n, %)		
White	49 (63.4)	29 (65.9)
Hispanic	24 (31.2)	13 (29.6)
Other/Unknown	6 (7.8)	4 (9.0)
Diabetes Medications Prescribed during the Pre-Index Date Period (n, %)		
Metformin	44 (55.7)	24 (52.2)
Insulin	60 (76.0)	36 (78.3)
Sulfonylurea	29 (36.7)	19 (41.3)
Thiazolidinedione	10 (12.7)	8 (17.4)
Diabetes Medications Dispensed during the Pre- Index Date Period (n, %)		
Metformin	NA	25 (54.4)
Insulin		24 (52.2)
Sulfonylurea		18 (39.1)
Thiazolidinedione		7 (15.2)
Mean Baseline HbA1C, % (SD)	10.3 (1.7)	10.3 (1.6)
9.0% (n, %)	55 (69.6)	32 (69.6)

Table 2

Health System Charges, Health Plan Costs, and Utilization 6-Months Pre-Index and 6-Month Post-Index in Medicaid Patients with Type 2 Diabetes Receiving Collaborative Drug Therapy Management

Category	Total Cohort (n=79)			Healthy U Subset (n=46)		
	Health System Data			Health System Data		
	6-Month Pre	6-Month Post	Difference	6-Month Pre	6-Month Post	Difference
Charge/Cost (US \$)						
<i>Outpatient Visits</i>						
Mean	2450	4623	2173	2882	4087	1204
Median	1389	2008	811	1608	1598	424
<i>Inpatient Admissions</i>						
Mean	2044	4264	2220	674	5443	4768
Median	0	0	0	0	0	0
<i>Emergency Department Visits</i>						
Mean	74	81	7	98	0	-98
Median	0	0	0	0	0	0
<i>Total Charges</i>						
Mean	4494	8887	4392	3557	9529	5973
Median	1553	2008	620	1656	1598	-1409
Utilization (Units)						
<i>Community Clinics *</i>						
Mean	6.1	9.5	3.4	6.3	9.0	2.7
Median	5	8	2	6	7	2
<i>Outpatient Clinics</i>						
Mean	7.9	12.7	4.8	8.4	11.9	3.5
Median	7	11	3	8	10	2
<i>Inpatient Admissions</i>						
Mean	0.2	0.1	-0.76	0.1	0.04	-0.02
Median	0	0	0	0	0	0
<i>Emergency Department Visits</i>						
Mean	0.04	0.1	-0.01	0.4	0	-0.04

Category	Total Cohort (n=79)				Healthy U Subset (n=46)				Health Plan Data			
	6-Month Pre	6-Month Post	Difference		6-Month Pre	6-Month Post	Difference		6-Month Pre	6-Month Post	Difference	
Median	0	0	0		0	0	0		0	0	0	
<i>Prescription Drug Orders</i>												
Mean	12.4	12.6	0.24		11.9	11.0	-0.9		22.6	26.6	4.0	
Median	11	11	0		11.5	9	-1.5		18	20	1	

* For Healthy U Health Plan utilization, Community Clinic utilization cannot be distinguished from other Outpatient Clinics