

Retrospective Analysis of Medication Adherence and Cost Following Medication Therapy Management

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ABSTRACT

Objective: To determine if pharmacist-provided medication therapy management (MTM) improves medication adherence in Medicare patients. A secondary objective is to compare the total monthly cost of a patient's prescription medication regimen 6 months before and 6 months following a comprehensive medication review (CMR). *Design:* Retrospective analysis of medication adherence, pre-post comparison. *Setting:* Three independent pharmacies in North Carolina. *Patients:* 97 Medicare Part D beneficiaries with one or more chronic disease states who participated in a comprehensive medication review (CMR). *Intervention:* MTM services provided by community pharmacists. *Main outcome measure:* Change in adherence as measured by the proportion of days covered (PDC) and change in medication costs for patients and third party payers. *Results:* Patients were adherent to chronic disease-state medications before and after MTM ($PDC \geq 0.8$). Overall, change in mean adherence before and after MTM did not change significantly (0.87 and 0.88, respectively; $p = 0.43$). However, patients taking medications for cholesterol management, GERD, thyroid and BPH demonstrated improved adherence following a CMR. No change in adherence was noted for patients using antihypertensives and antidiabetic agents. Average total chronic disease-state medication costs for participants were reduced from \$210.74 to \$193.63 ($p=0.08$) following the comprehensive medication review. Total costs for patient and third party payers decreased from patients prescribed antilipemics, antihypertensives, GERD and thyroid disorders following a CMR. *Conclusions:* Pharmacist-provided MTM services were effective at improving medication adherence for some patients managed with chronic medications. Pharmacist-provided MTM services also were effective in decreasing total medication costs.

Keywords: adherence, medication therapy management, comprehensive medication reviews, disease management, chronic disease, community pharmacy

Introduction

It has been reported that approximately one in four people is not adherent to his or her prescribed drug regimen.^{1,2} Nonadherence to long-term medication regimens can lead to increased mortality, morbidity and health care costs.^{3,4,5} Reports indicate that 33-69% of medication-related hospital admissions in the United States are due to poor medication adherence.⁶⁻¹⁰ Consequently, lack of adherence has resultant financial implications equal to approximately \$100 billion each year.¹⁰ Nonadherence, particularly in the Medicare population, is of concern due to the ubiquity of chronic

disease and medication usage. In a study conducted in 2004 by Kennedy and colleagues, it was estimated that approximately 1.6 million Medicare beneficiaries were not filling all of their prescribed medications.⁵ Medicare beneficiaries with chronic disease states are prescribed therapy for optimal disease-state management. Thus, if patients are not adherent by failing to fill or properly take prescribed medications, they may experience poor health outcomes.

The Medicare Prescription Drug, Improvement, and Modernization Act (MMA) of 2003 provided new financial opportunities for pharmacists to expand Medication Therapy Management (MTM) services and provide comprehensive medication reviews (CMR) to all eligible Medicare Part D beneficiaries.¹⁹ Since the implementation of MMA, MTM has

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been implemented in pharmacies across the nation to improve patient outcomes and aid in the detection of medication nonadherence.^{7,11,12} MTM, when appropriately employed, can lead to improvements in medication adherence, recognition in medication therapy problems, and reduction in overall health costs. Research demonstrates that a pharmacist may play an integral role in influencing a patient's adherence to a medication regimen. Project ImpACT provided data to suggest that pharmacists working collaboratively with patients and health care providers were effective in promoting patient adherence with prescribed dyslipidemic therapy.^{7,11,19} Other studies, including the Asheville Project¹³ and the Patient Self-Management Program for Diabetes,¹⁴ have demonstrated that pharmacists can improve health outcomes and reduce overall health care costs.¹²

Although a number of studies have evaluated nonadherence among Medicare beneficiaries with chronic diseases, limited data is available to demonstrate the effectiveness of comprehensive medication reviews (CMRs) conducted by community pharmacists in the improvement of medication adherence.^{15,16} In this study we investigated if MTM services conducted at three independent pharmacies improve medication adherence in Medicare patients. The data collected from this research was intended to serve as a quality improvement opportunity in MTM service performance.

Objectives

The primary objective of this study was to evaluate if CMRs conducted at community pharmacies improve medication adherence in Medicare patients. A secondary objective was to compare the total monthly cost of a patient's prescription medication regimen six months before and six months following the CMR.

Methods

Study Design and Setting

This retrospective, cohort study was initiated at three locations of an independent pharmacy in North Carolina. These locations are approximately 15 miles apart from one another in the towns of Concord, Mount Pleasant and Midland, North Carolina. Moose Pharmacy, a family-owned business established in 1882, has been conducting MTM services for nearly a decade. In 2007, Moose Pharmacy's MTM program was greatly enhanced with the development of CheckMeds NC. CheckMeds NC, a financially supported program developed through the state's Health and Wellness Trust Fund was designed to ensure that Medicare beneficiaries were provided a CMR by a pharmacist. As an incentive for pharmacists to provide this service,

compensation was made available for conducting such face-to-face medication consultations. With the opportunity to develop quality relationships with our patients and to take advantage of financial incentives, Moose Pharmacy began to actively provide CMRs for program eligible patients.

Study Participants

Study participants were drawn from a population of 172 patients who were receiving known treatment for one or more chronic diseases. Participants included those patients who were ≥ 65 years of age, a resident of North Carolina, and a Medicare Part D beneficiary. Patients with a documented CheckMeds NC claim for a CMR during the time period of October 2007 through April 2008 were identified using the Outcomes Pharmaceutical Health Care® billing platform. For each eligible patient identified to have a CMR during this specified time period, prescription refill history was observed 6 months before and after the documented date of the CMR service. Exclusion criteria included patients who refill prescriptions at an outside pharmacy and patients who have discontinued chronic disease therapy throughout the study period. Patients with disease states that require therapy change (i.e. depression and pain management) were also excluded. Each patient who met the inclusion criteria underwent evaluation by classification of type of chronic disease(s) and treatment regimen(s). This information was acquired by viewing patient medication records stored in Visual Pharmacy®, the program utilized in the pharmacies for prescription dispensing.

Adherence Analysis

To determine the extent of each patient's adherence to a chronic disease medication regimen, the proportion of days covered (PDC) were calculated 6 months before and 6 months after CMR documentation for each maintenance medication. PDC is an objective measurement of drug adherence that is widely used to evaluate medication adherence in chronic diseases and is defined as the number of days covered by prescription claims for the same drug or for another drug in the same therapeutic class divided by the number of days in the specified time interval.^{3,20} Patients with a PDC ≥ 0.8 were considered adherent. Conversely, patients with a PDC < 0.80 were considered nonadherent. After calculating the PDC for each patient's chronic disease medication, change in adherence was analyzed and classified either as increased or decreased adherence following the CMR. An average PDC including each patient's chronic medications pre and post- CMR was then configured.

Cost Analysis

The total cost of chronic medications was configured for each patient before and after the CMR. The total cost was further

analyzed by evaluating each patient's co-pay per chronic medication refill and the third party payment for the chronic medications. The average medication costs for the patient, third party payer, and total costs were calculated before and after the CMR. A total average cost of chronic medications based on medication classification was also calculated before and after the CMR.

Statistical Analysis

Descriptive statistics were used to report baseline characteristics including age, sex, chronic diseases, prescribed treatment, and medication costs. A paired t-test was used to analyze adherence before and after CMR of included patients. A paired t-test was also used to compare mean medication costs before and after the CMR.

Results

Patient population characteristics

Of the 172 patients assessed for eligibility, 75 patients were excluded from the analysis due to lack of complete pharmacy data. Discontinuation of therapy, transfer of medications to an outside pharmacy and medication regimens without chronic medications contributed to these exclusions. A total of 97 patients met the inclusion criteria and underwent analysis. Demographics and baseline characteristics of study participants are presented in Table 1. The analysis of each patient's medication regimen involved a variety of medication classes including antilipemic, antihypertensive, antidiabetic, GERD/heartburn, thyroid, and BPH agents (Figure 1). Medications classified as "Other" included asthma and COPD agents, estradiol, conjugated estrogens, latanoprost, solifenacin, and pentoxifylline.

Adherence Analysis

As shown in Figure 2, patients were adherent to chronic disease-state medications before and after the CMR. Prior to the CMR, patients' average proportion of days covered was 0.872. In the 6 months following the CMR, average adherence to chronic medications improved to 0.883. Although the mean PDC increased by 1.25%, the difference in PDC between the pre-CMR and post-CMR groups [95% CI 1.17-2.73] was not statistically significant ($p=0.43$). Figure 3 represents average patient adherence before and after the CMR based on disease-state. Patients taking medications for cholesterol management GERD, Thyroid and BPH disease-states demonstrated improved adherence following a CMR with an increase mean adherence of 3.5%, 3.4%, 29.4% and 3.9% respectively. Patients prescribed antihypertensive and antidiabetic medications demonstrated no change in adherence following a CMR. Patients using medications classified as "other" demonstrated a 3.9% decrease in adherence following the CMR.

Cost Analysis

The average dollars spent on the chronic medication regimen of study participants is shown in Figure 4. Six months prior to the CMR, patients were paying an average of \$45.34 for chronic medications. Six months following the CMR, patient's co-pay increased by \$2.45 per regimen on average. Conversely, third-party payer cost decreased from pre-CMR to post-CMR by \$21.55. Furthermore, total medication costs prior to the CMR averaged to be \$210.74 as compared to \$193.63 following the CMR ($p=0.08$).

The average total dollars spent on chronic medications per medication classification is shown in Figure 5. Following the CMR, total costs for patient and third party payers decreased for patients taking Antilipemics, Antihypertensives, GERD and Thyroid products. For patients taking medications that fall into the "Other" classification and BPH, the total costs for patients and third party payers increased by \$68.58 and \$40.38 respectively following the CMR.

Discussion

This study evaluated whether pharmacist-provided CMRs were effective at improving adherence and impacting medication costs in our Medicare beneficiaries. The average adherence measure was compared six months before and six months after a CMR. The PDC, an adherence measure, increased following the CMR by 1.25%.

When conducting a quality CMR, there are many issues to address with a patient regarding his or her medication therapy. Pharmacist-provided MTMs are designed to identify drug therapy problems such as: drug interactions, cost-effective alternatives, adverse drug reactions, unnecessary therapy, proper administration/technique, insufficient dose and medication underuse. It is imperative for a pharmacist to address underutilization when identified and determine the cause of patient non-adherence during complex drug review opportunities. Less than optimal health outcomes can be prevented if patient nonadherence is identified and resolved by a pharmacist.

There are a variety of ways for pharmacists to provide medication adherence interventions. For example, when appropriate, pharmacists should assist in simplifying a patient's drug regimen.¹⁷ Once-daily dosing of medication will result in optimal adherence as well as recommending combination products when available (i.e. lisinopril/HCTZ). Secondly, pharmacists can provide tools to help patients remember medication regimens.⁸ Encouraging patients to use pill boxes, instructing patients to associate pill taking with a daily activity, and getting family members involved are some examples. Additional interventions to promote

medication utilization may include identifying medication cost reduction opportunities and clearly communicating benefits and risks of medications. When consulting on a particular medication, we educate patients by highlighting the benefits of adherence to regimen, and then discussed the risks to help prevent any fear of the medication that may be the cause of non adherence. During a consultation session, it is also important to not overwhelm patients when discussing a medication side effect profile. Instead, focus education strategy on the most commonly reported side effects experienced with new therapy. Patients must feel empowered by the education that a pharmacist provides and use this knowledge to optimize individualized health outcomes. In many situations, a combination of interventions may have the most benefit in improving adherence.¹⁸

A secondary objective was to compare the costs of a patient's medication regimen before and after CMR. Prescription co-pays did increase for study participants by \$2.45 following the CMR. There are several potential explanations that may be offered to explain this increase in patient co-pays and a decrease in total medication costs in this project. One possibility is that the pharmacist conducting the CMR may have identified a chronic condition that was not properly treated. Thus, the pharmacist addressed this issue by recommending an additional medication to the patient's prescriber. Another explanation is that the pharmacist may have recommended a more expensive alternative to current medication regimen while recommending that the patient discontinue any inappropriate or unnecessary therapy. Overall, this scenario would directly affect a patient's co-pay. Finally, the patient may have become more adherent to their medication(s). Based on the results of this study, medication adherence did increase. Therefore, it is not unexpected to see a patient's co-pay increase.

In any scenario, it is important to understand that this cost analysis provides only a limited snapshot of total healthcare costs and specifically targets prescription medication costs. Even though this study demonstrated a slight increase in a patient's copay, total medication costs decreased. According to the results of this study, pharmacist-provided MTM services can result in cost saving benefits. There are many advantages in having a prescription drug regimen that is cost-effective. One advantage is that, it saves patients with Medicare out of pocket costs by avoiding the coverage gap. Moreover, generic utilization saves money for third party payers. Currently, a majority of third party payers do not recognize pharmacist involvement in cost-savings, and therefore do not offer pharmacists financial incentives for performing cost saving targeted medication reviews.

Limitations

This study has several limitations that should be considered. First, although some pharmacists at this independent pharmacy had experience providing MTM services in the past, most pharmacists at this practice site had limited experience providing CMRs. The CheckMeds program was not fully implemented in the pharmacy until October 2007, which was the first month of the study period. Although the CheckMeds program greatly enhanced the MTM service at the pharmacy, there is a possibility that pharmacists were focusing the CMR on issues unrelated to adherence. Secondly, there was a small time frame for adherence and cost assessment (six months pre-CMR and six months post-CMR). Therefore, this may not be an adequate time frame to detect a statistical significance. The sample size was also smaller than anticipated, thus limiting the sample size and power. A limited sample size may lessen the opportunity to see a statistically significant outcome. The study sites (3 pharmacies) are all located within 15 miles of one another. Thus, it may be inappropriate to generalize the results for all populations as the study cohort was derived from a limited area. Lastly, the study location has been associated with a university-related residency program for seven years. This site has also been affiliated with introductory and advanced pharmacy practice experience programs with three schools of pharmacy. Therefore, a resident and many students completing practice experiences are available to devote attention in managing patient medication regimens. The PDC suggested that patients at this pharmacy were adherent six months prior to the CMR. This may be related to increased attention to patient's medication regimen at this study location. Pharmacies that are not associated with schools of pharmacy or residency programs may not have additional staff to focus on patient's medication regimens, and would therefore be expected to have lower PDCs 6 months prior to a CMR.

Conclusions

Results demonstrated a clinically significant outcome to support the effectiveness of MTM services in improving medication adherence. Results failed to demonstrate statistically significant evidence to support the effectiveness of MTM services in improving medication adherence despite improvement in PDC. MTM, when properly employed may be effective in decreasing total medication costs. This is one indication that pharmacist-provided CMRs may be effective at decreasing the cost of our patient's medication regimen. Overall, data from this research may enhance pharmacists' MTM delivery skills to recognize when patients are non-adherent to their medication regimen. Additional research is needed to appropriately evaluate if pharmacist-provided

MTMs are effective at increasing medication adherence and decreasing medication costs.

References

1. DiMatteo MR. Variations in patients' adherence to medical recommendations: a quantitative review of 50 years of research. *Med Care*. 2004; 42(3):197-9.
2. Simpson SH, Eurich DT, Majumdar SR, et al. A meta-analysis of the association between adherence to drug therapy and mortality. *BMJ*. 2006; 333.
3. Rishi S, Xia F, Aubert R. Estimating Medication Persistency Using Administrative Claims Data. *Am J Manag Care*. 2005;11:449-457.
4. Kreyenbuhl J, Dixon LB, et al. Does Adherence to Medications for Type 2 Diabetes Differ Between Individuals With Vs Without Schizophrenia? *Schizophrenia Bulletin*. August 2008.
5. Kennedy, J, Tuleu I, Mackay K. Unfilled Prescriptions of Medicare Beneficiaries: Prevalence, Reasons, and Types of Medicines Prescribed. *J Manag Care Pharm*. 2008;14(6):553-560.
6. McDonnell PJ, Jacobs MR. Hospital Admissions Resulting from Preventable Adverse Drug Reactions. *Ann Pharmacotherapy*. 2002;36:1331-1336.
7. Krueger KP, Felkey BG, Berger BA. The Pharmacist's Role in Treatment Adherence. Part 4: Do Adherence Interventions Really Have An Impact. *US Pharmacist*. 2005;5:62-66.
8. Osterberg L, Blaschke T. Adherence to Medication. *New Eng J Med* 2005; 353:487-97.
9. Krueger KP, Berger BA, Felkey B. Medication adherence and persistence; a comprehensive review. *Advances in Therapy*. 2005; 22(4):313-56.
10. Senst BL, Achusim LE, Genest RP, et al. Practical approach to determining costs and frequency of adverse drug events in a health care network. *Am J Health Syst Pharm*. 2001; 58(12):1126-32.
11. Bluml BM, McKenney JM, Cziraky MJ. Pharmaceutical care services and results in project ImPACT: hyperlipidemia. *J Am Pharm Assoc*. 2000;40(2):143-144.
12. American Pharmacists Association. Medication Therapy Management Digest; Perspectives on MTM Service Implementation. 2008; 1-25.
13. Cranor CW, Bunting BA, Christensen DB. The Asheville Project: long-term clinical and economic outcomes of a community pharmacy diabetes care program. *J Am Pharm Assoc*. 2003; 43:173-4.
14. Garrett DG, Bluml BM. Patient self-management program. Patient self-management program for diabetes: first-year clinical, humanistic, and economic outcomes. *J Am Pharm Assoc*. 2005;45:130-7.
15. Hauptman PJ, Pressler SJ, Sackner-Berstein J, et al. Rationale and design of CASPER: compliance and quality of life study comparing once-daily carvedilol CR and twice daily carvedilol IR in patients with heart failure. *Am J Cardiol*. 2006; 98(7A):60L-66L.
16. Rasmussen JN, Chong A, Alter DA. Relationship between adherence to evidence-based pharmacotherapy and long-term mortality after acute myocardial infarction. *JAMA*. 2007;297:177-186.
17. Claxton AJ, Cramer J, Pierce C. A systematic review of the associations between dose regimens and medication compliance. *Clin Ther* 2001;23:1296-310.
18. Haynes RB, Yao X, Degani A, et al. Interventions to enhance medication adherence. *Cochrane Database Syst Rev* 2005;(4):CD000011.
19. Center for Medicare and Medicaid Services. Higher Quality Health Care Through Medicare's Modernization Benefits. Available from: http://www.pharmacist.com/AM/Template.cfm?Section=Resource_Library&TEMPLATE=/CM/ContentDisplay.cfm&CONTENTID=19071. Accessed August 2009.
20. Pharmacy Quality Alliance. PQA Cardiovascular Group Adherence Measures. Available from: http://www.pqaalliance.org/files/cardiovascular_finalnov.20.doc. Accessed July 29, 2010

Table 1. Demographics	
N (total)	97
Gender, No (%)	
Male	33 (34.1)
Female	64 (65.9)
Age (years)	75.8
Number of chronic medications/person, mean (range)	2.22 (1-6)

Figure 1: Chronic Medications Used By Participants (n=215)

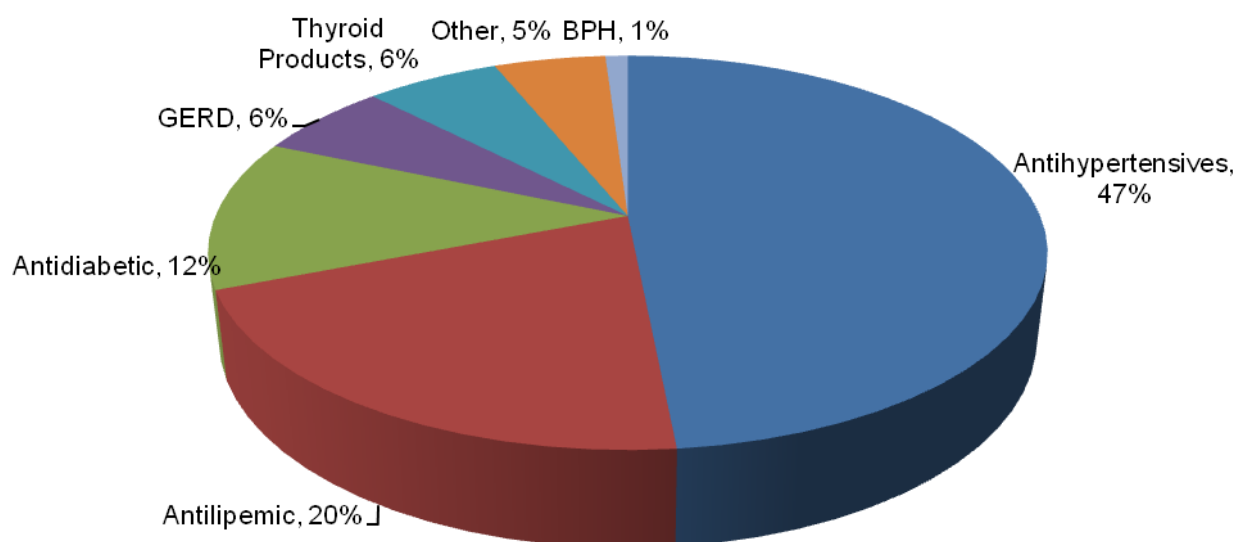


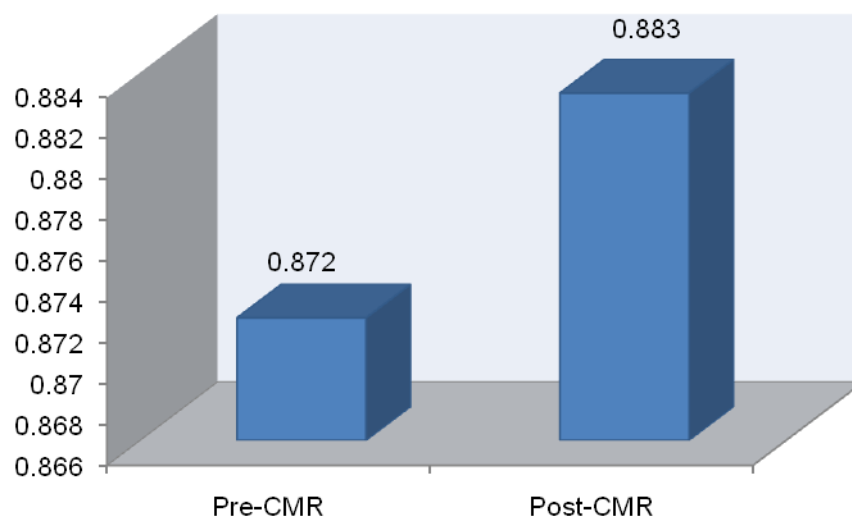
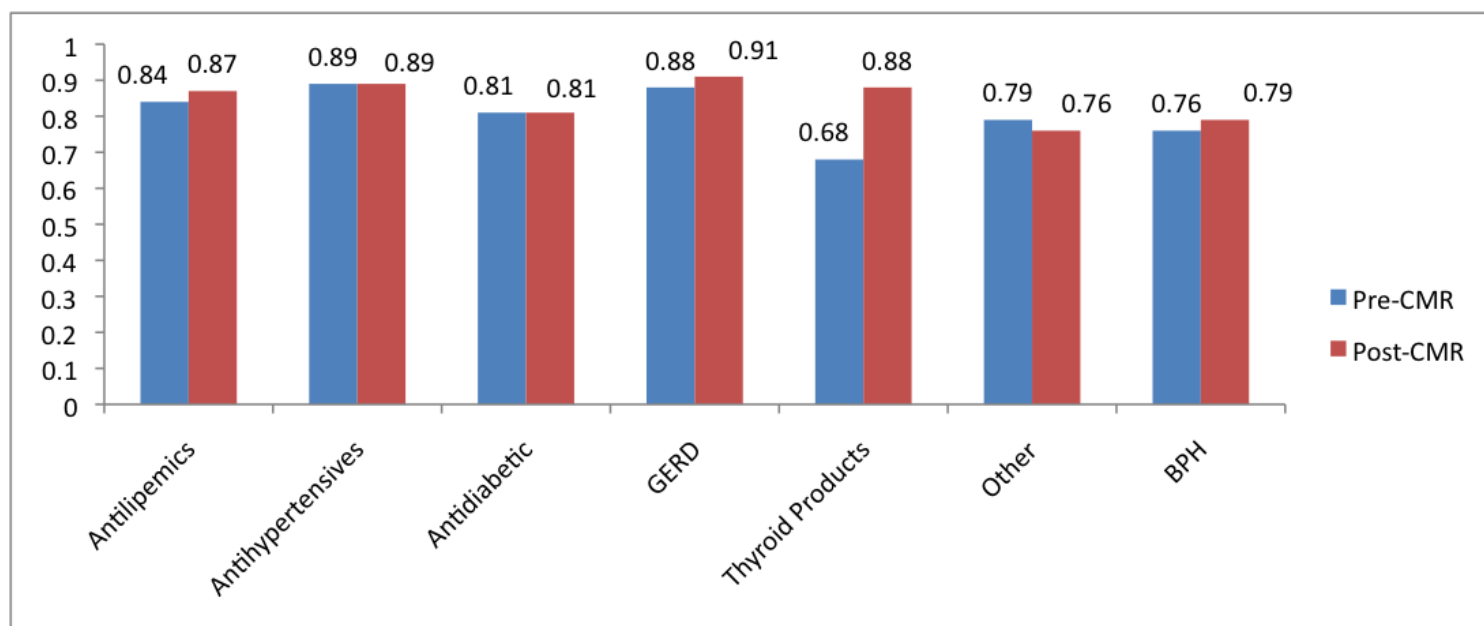
Figure 2: Medication Adherence Before and After Comprehensive Medication Review**Figure 3: Medication Adherence Before and After Comprehensive Medication Review Per Medication Classification**

Figure 4: Cost Analysis Before and After Medication Therapy Management

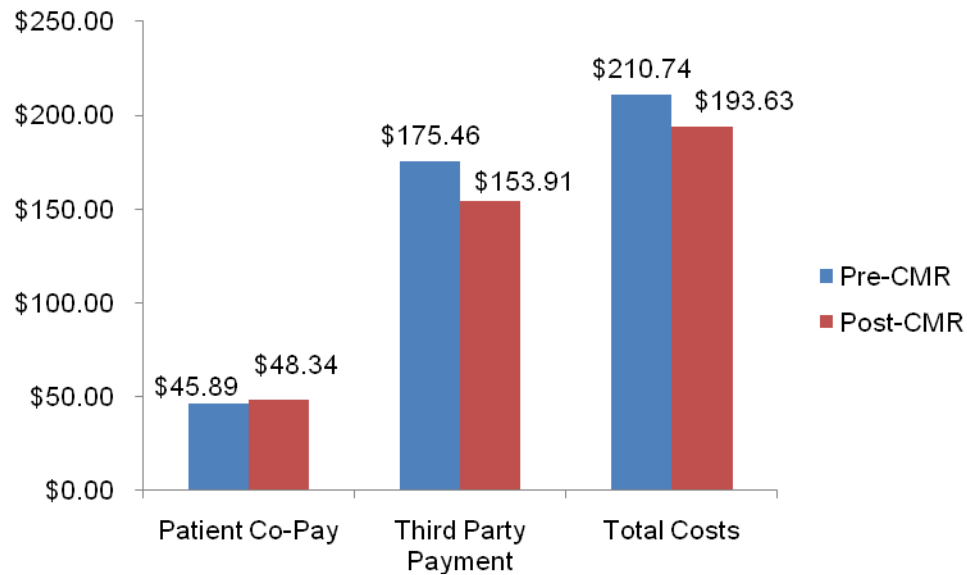


Figure 5: Cost Analysis Before and After Medication Therapy Management Per Medication Classification

