

Medication Therapy Management

Evaluation and Lessons Learned

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Table of Contents

Executive Summary	3
The Medication Therapy Management Benefit	4
Overview	4
Intervention-Based Services	4
Comprehensive Medication Review and Assessments	5
Research Objectives and Approach	5
Research Time Frames	5
Defining Interventions	6
Program Scale	6
Number of Interventions and Growth Over Time	6
Intervention Length	7
Repeated Interventions per Member	8
Members Served	8
Number of Members Served	8
Demographics	9
ForwardHealth Delivery Method and Program Type	10
Pharmacy Participation	11
Number of Pharmacies Participating	11
Geographic Differences in Pharmacy Participation	12
Chain Versus Independent Pharmacies	13
Long-Term Care Pharmacies	14
Program Effectiveness	15
Effectiveness Metrics	15
Changes in Claims Volume or Cost	15
Increase in Percent of Drugs that are Generic	15
Conversion to Three-Month Supply	15
Use of Control Group	15
Impact on ForwardHealth Costs	16
Impact on Claims Volume	19
Impact on 90-Day Supply Conversions	21
Conclusions and Next Steps	21

Appendix: Control Group Construction and Validation	22
Identifying Key Variables	22
Building the Control Group	22
Validation	23
Validation Data for Overall Control Group	24
Validation Data for CMR/A Control Group	25

Executive Summary

The Medication Therapy Management (MTM) benefit reimburses pharmacists for time spent working with ForwardHealth¹ members (who include BadgerCare Plus, Medicaid, Supplemental Security Income [SSI], and SeniorCare members) to more effectively manage their medication regimen with the goal of improving member health in a cost-effective manner. In the 34 months between the benefit's implementation on September 1, 2012, and the end of state fiscal year 2015 (June 30, 2015), 551 pharmacies have participated, delivering 75,244 MTM interventions to 41,660 members.

The most common interventions were *focused adherence* (encouraging members to follow their medication plan), *three-month supply* (encouraging members to switch from one-month to three-month supplies where possible), and *cost-effectiveness* (a variety of measures designed to lower costs, such as generic substitution, conversion to over-the-counter equivalents, or tablet splitting). Comprehensive medication review and assessments (CMR/As) accounted for 4 percent of all MTM interventions.

MTM recipients include both fee-for-service and HMO members and represent all program types (BadgerCare Plus, Medicaid, SSI, and SeniorCare). Roughly two-thirds of them are women, and the average recipient is 44 years old. A substantial percentage (19 percent) of recipients is children. Children are more likely than adults to receive interventions focused on cost-effectiveness, medication device instruction, or dose/form/duration changes. This is likely due to children needing instruction for diabetic supplies and inhalers. Additionally, during phases of rapid growth, children would be expected to need frequency dose/form/duration changes in their medication regimen.

Forty-two percent of ForwardHealth pharmacies have participated in the MTM program. Chain pharmacies are more likely to participate than independents, but when independent pharmacies do participate, they deliver more interventions than chain pharmacies and are more likely to engage with CMR/As. Long-term care (LTC) pharmacies are less likely to participate in MTM. When they do participate, they deliver as many CMR/As as non-LTC pharmacies but perform fewer intervention-based services.

MTM participation varies geographically. Notably, the participation rate is fairly low in Milwaukee County, suggesting a potential opportunity for outreach.

Evaluating MTM's impact on claim costs and related metrics requires focusing on MTM recipients for whom we have a full year of adjudicated claims after their initial intervention. This, in turn, limits the evaluation to roughly the first quarter of members who participated in the program. Thus, the current analysis should be viewed as an initial assessment of the program's short-term impact.

To date, MTM program's impact on ForwardHealth costs has been a net increase of \$556 per MTM recipient per year, driven mostly by increased pharmacy costs. The pharmacy cost increase was anticipated since a goal of the program was to get members to consistently take their medications. MTM's impact on costs is larger when excluding SeniorCare members (net increase of \$679) and when focusing on those receiving a CMR/A (net increase of \$1,139).

In one important area, however, the program has lowered costs. MTM recipients' inpatient costs are \$102 lower per person on average in the year after the intervention. This suggests that the increased pharmacy usage is associated with a positive health benefit for recipients.

¹Throughout this report, "ForwardHealth" refers to all pharmacy benefits provided by the ForwardHealth program. The term "Medicaid" is used only to refer to the specific Medicaid benefit plan that is part of ForwardHealth.

The MTM program has also been successful at converting 30-day prescriptions to 90-day prescriptions. MTM recipients converted to 90-day prescriptions at 1.5 times the rate that control group members did.

The **next steps** should include tracking key cost metrics identified in this study over time to see if the cost impact becomes more positive as the program matures, as well as identifying the health conditions, prescriptions, and other characteristics of members for whom the MTM program is the most effective.

The Medication Therapy Management Benefit

Overview

Effective September 1, 2012, ForwardHealth implemented an MTM benefit in conjunction with the Wisconsin Pharmacy Quality Collaborative (WPQC). The MTM benefit reimburses pharmacists for a variety of services provided to members designed to assist them in managing their medications. The intent is to improve patient health in a cost-effective manner.

MTM services are divided into two categories: intervention-based services (IBS), which typically take only a few minutes and typically focus on only one drug, and CMR/As, which are consultative reviews of the member's overall drug regimen.

Intervention-Based Services

Intervention-based services are voluntary face-to-face member assessments performed by a pharmacist and consist of eight types of interventions:

- Cost-effectiveness: a cost-effectiveness intervention may be one or more of the following:
 - Formulary interchange (generic substitution)
 - Therapeutic interchange (switching the prescribed drug for a most cost-effective drug in the same therapeutic class)
 - Tablet splitting opportunity
 - Conversion to over-the-counter product
 - Dose consolidation
- Three-month supply: streamlines the drug-refilling process and reduces packaging and labor costs associated with monthly refills
- Dose/dosage form/duration change: allows changes due to many factors, including age, drug-drug/food interactions, excessive duration or quantity, etc.
- Focused adherence: consultation aimed at getting the member to follow their drug regimen more closely
- Medication addition: based on clinical guidelines, indications, adverse drug reactions, drug-drug/food interactions, FDA safety alert, etc.
- Medication deletion: based on clinical guidelines, indications, adverse drug reactions, drug-drug/food interactions, FDA safety alert, etc.
- Medication device instruction: a consultation with the member or a caregiver focused on how to use a medical device associated with a medication
- In-home medication management: provided to members who are unable to pick up their medications and have no one who can pick their medication up on their behalf.

Any ForwardHealth-eligible pharmacy can be reimbursed for intervention-based services.

Comprehensive Medication Review and Assessments

CMR/As may include analytical, consultative, educational, and monitoring services. The goal is to help members get the best results from medications through enhancing consumer understanding of medication therapy, increasing adherence to medications, controlling costs, and preventing drug complications, conflicts, and interactions.

CMR/As are subdivided into initial assessments and follow-up (monitoring) assessments.

To be eligible for a CMR/A, a member must be in a group that meets one of the following criteria:

- The member takes four or more prescription medications to treat or prevent two or more chronic conditions, one of which must be hypertension, asthma, chronic kidney disease, congestive heart failure, dyslipidemia, chronic obstructive pulmonary disease (COPD), or depression.
- The member has diabetes.
- The member requires coordination of care due to multiple prescribers.
- The member has been discharged from the hospital or LTC setting within the past 14 days.
- The member has health literacy issues as determined by the pharmacist.
- The member has been referred for MTM services by the prescriber.

To be reimbursed for a CMR/A, the pharmacists and the pharmacy must be certified by the only approved MTM certification program, which is conducted by the WPQC. The Pharmacy Society of Wisconsin (PSW) manages the WPQC training and certification process.

Research Objectives and Approach

The objective of the current research was to evaluate how effectively the MTM benefit has been meeting its goal of cost-effectively improving member health outcomes and derive “lessons learned” from the program to-date. Effectiveness was conducted by looking at the scale and cost of the MTM interventions, how many (and what type) of members have benefited, and how widely pharmacies have embraced the program.

Next, an examination of the number of both cost and health metrics was done, looking for changes between the 12 months prior to a member’s first MTM intervention (pre-intervention) and the 12 months after their first intervention (post-intervention). A control group was used to determine if any observed changes were attributable to the MTM intervention.

Details on the control group methodology and how specific metrics were calculated are referenced throughout this report where they first become relevant. Two overarching concepts, however, deserve to be addressed up front – the time frames used for analysis and how (counted) MTM interventions were defined.

Research Time Frames

Two different time frames were used in this research. Our descriptive analysis of the program (e.g., number of interventions, members served, and participating providers) considered all paid MTM claims with a date of service from September 1, 2012, through June 30, 2015. This will be considered as *reporting time frame*. Our evaluation of the program’s effectiveness, however, only considered interventions that occurred between September 1, 2012, and March 31, 2014. This will be referred to as the *evaluation time frame*.

The reason for the more restrictive evaluation time frame is to allow for 12 months of claim activity to be recorded both before and after the intervention and to allow for a three-month billing lag. A member whose first MTM intervention occurred on March 31, 2014, would have a post-intervention period of April 1, 2014, through March 31,

2015, and a claim from March 31, 2015, would have had three months to be billed and adjusted by the time the analysis began (June 30, 2015).

Defining Interventions

For purposes of this research, an MTM intervention was defined as a unique, active, paid claim with Title XIX as the payer and a procedure code of 99605 or 99606. The procedure code 99607 also denotes an MTM claim but is used to bill for additional 15-minute segments on longer interventions. Thus, it is not appropriate to include detail lines with the 99607 code when counting interventions.

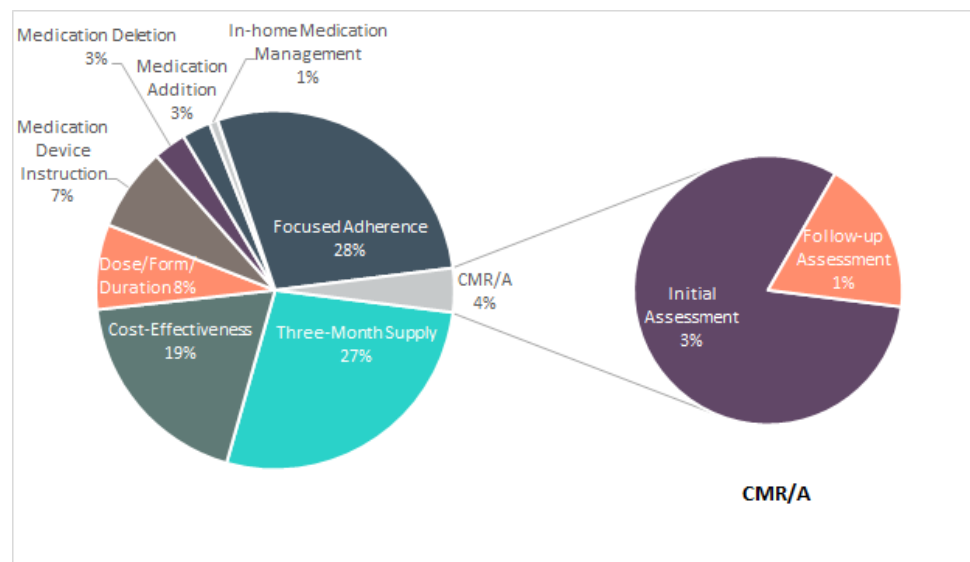
Note that interventions are defined at the claim detail line level. This means that if a pharmacist did a focused adherence and a three-month supply with the same member on the same date, this would count as two interventions.

Program Scale

Number of Interventions and Growth Over Time

From its inception on September 1, 2012, through June 30, 2015 (the reporting time frame), Wisconsin's MTM program resulted in 75,244 interventions given to 41,660 members.² As shown in Figure 1, the vast majority of those were IBS interventions, primarily *focused adherence*, *three-month supply*, and *cost-effectiveness*. The 2,975 CMR/As conducted accounted for only 4 percent of total interventions, and more than three-quarters of those were initial assessments. This means that most CMR/A members had not received a follow-up assessment as of June 30, 2015.

Figure 1: MTM Interventions by Type

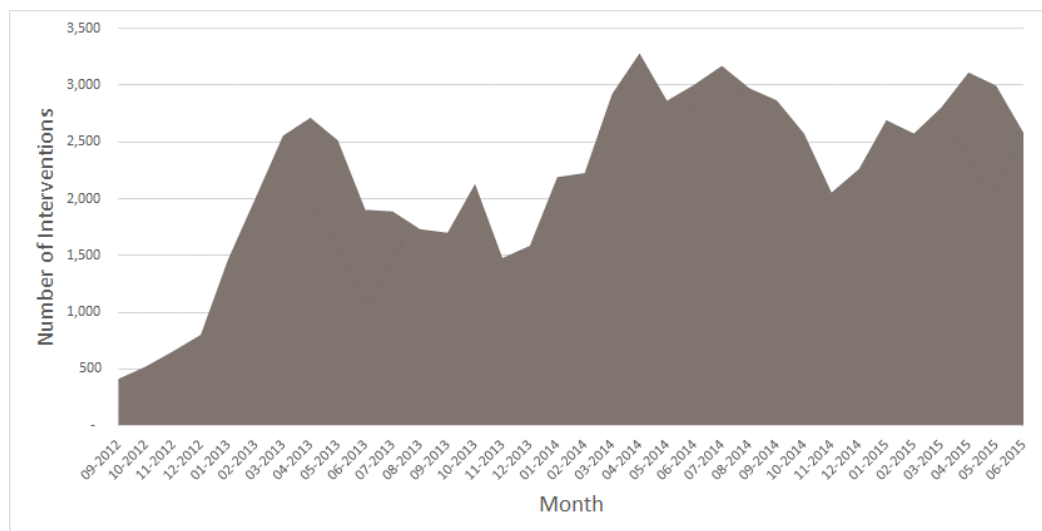


N = 75,244 interventions

Figure 2 shows the pattern of MTM interventions over time. After a slow start, the program took off in the first quarter of calendar year 2013, only to see volumes decline for the remainder of the year. In 2014, the program saw another sharp uptick, leading to mostly steady volume through June of 2015.

²For comparison, the shorter evaluation time frame included 33,423 interventions and 12,658 members.

Figure 2: MTM Interventions Over Time (Includes both IBS and CMR/A)



N = 75,244 interventions

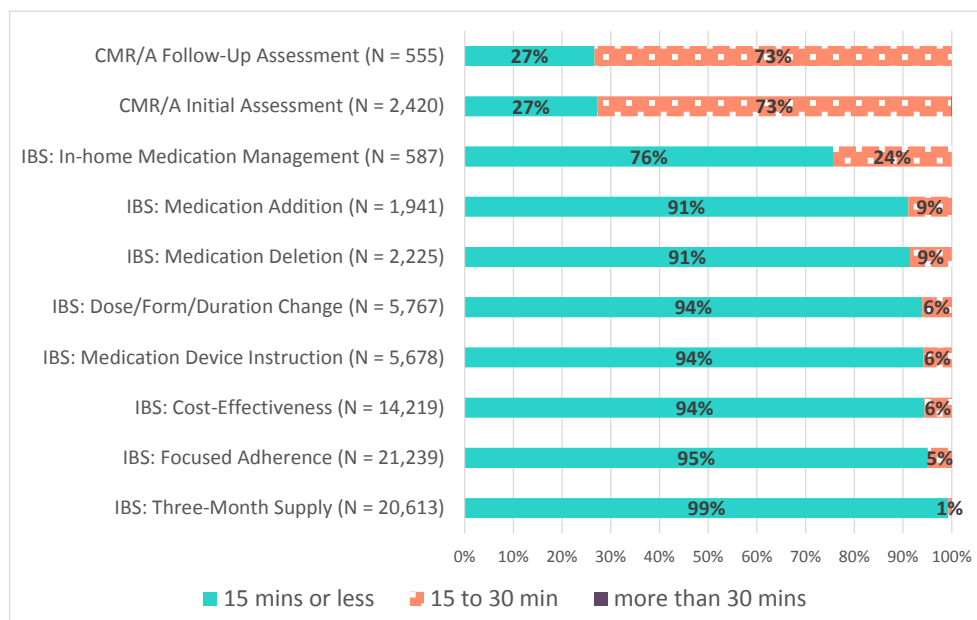
Intervention Length

Of the 75,244 MTM interventions, 93 percent took 15 minutes or less of pharmacist time. Another 7 percent lasted between 16 and 30 minutes, and a handful (eight interventions, or 0.01 percent) took longer than 30 minutes.

As seen in Figure 3, CMR/As (Initial and Follow-up Assessments) typically required 15 to 30 minutes, though a quarter took 15 minutes or less.

Among IBS interventions, a quarter of In-Home Medication Management services took longer than 15 minutes. All other IBS interventions were 15 minutes or less in 90 percent or more of the cases.

Figure 3: MTM Interventions by Type and Length

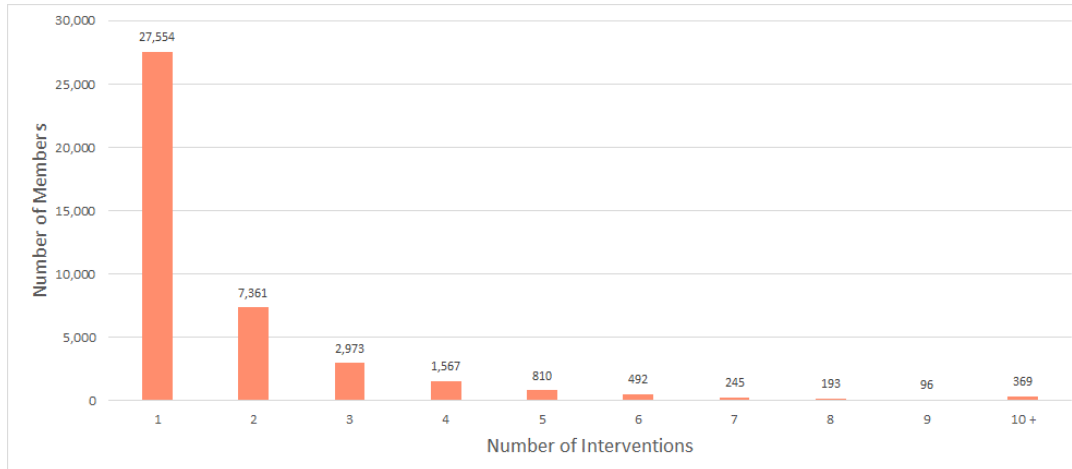


N = 75,244 interventions

Repeated Interventions per Member

A third of all MTM recipients had more than one MTM intervention, and the average MTM recipient had 1.8 interventions. Figure 4 provides a further breakdown of these data.

Figure 4: Number of Members Receiving Different Numbers of Interventions



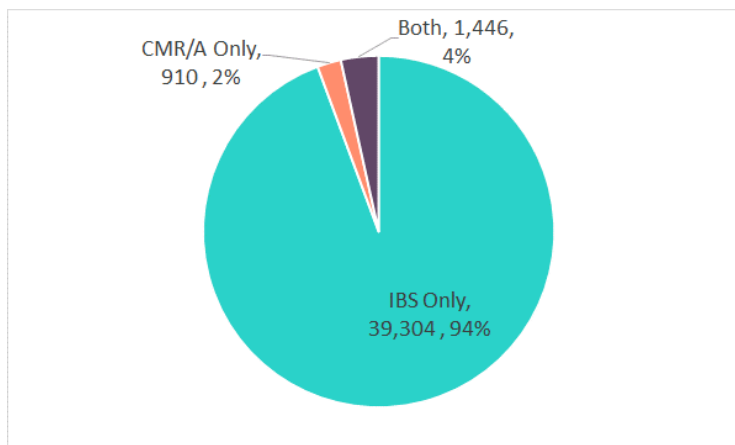
N = 41,660 members with interventions

Members Served

Number of Members Served

By June 30, 2015, 41,660 Wisconsin ForwardHealth members, or roughly 4 percent of the total ForwardHealth population, had received one or more MTM interventions. Of those, 2,356, or 6 percent, had at least one CMR/A intervention. As shown in Figure 5, there is some overlap between the populations receiving IBS and CMR/A services, with the majority of CMR/A recipients having also had at least one IBS intervention. It should be noted that in-home medication management is the only IBS service that can be given on the date of a CMR/A.

Figure 5: Number of Members Receiving IBS Only, CMR/A Only, or Both Intervention Types

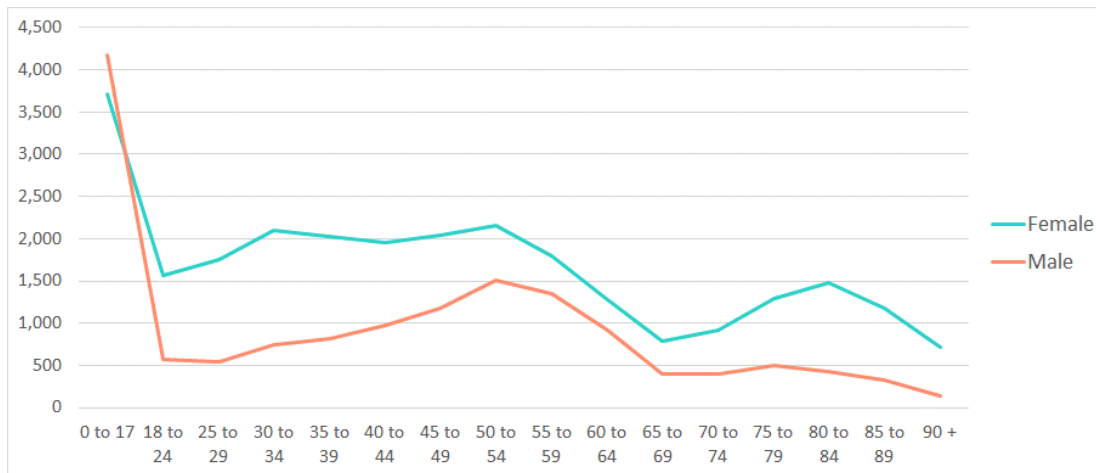


N = 41,660 members with interventions

Demographics

Roughly two-thirds of members receiving MTM interventions (64 percent) are female – a gender ratio that is generally consistent with the overall ForwardHealth population in Wisconsin. The average age of an MTM intervention recipient is 44, with female recipients being slightly older than male recipients (46 versus 40).

Figure 6: Age and Gender of MTM Recipients

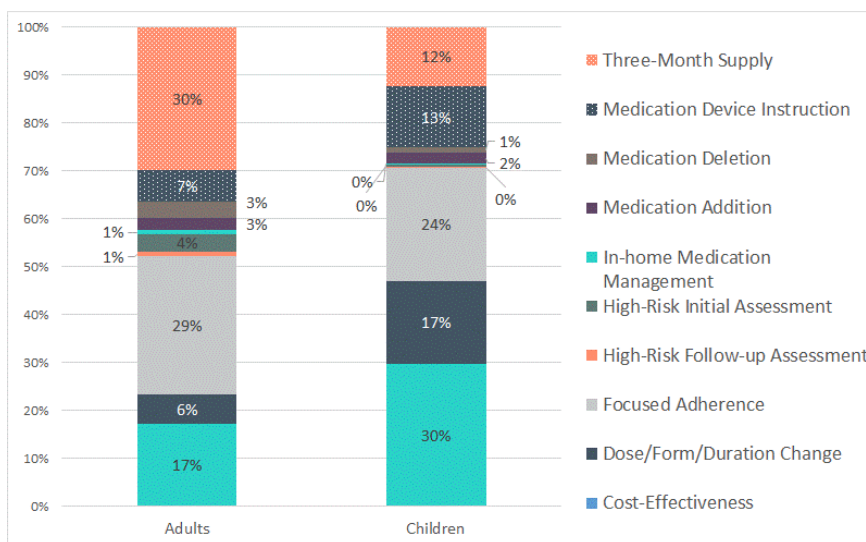


N = 41,660 members with interventions

As seen in Figure 6, the gender gap among MTM recipients is widest for members in their 20s and 30s or in their 80s. Figure 7 also reveals the large number of MTM recipients who are children. Almost a fifth of all MTM interventions (19 percent) were done on behalf of members under the age of 18.

As shown in Figure 7, the types of interventions received by adults and children are somewhat different. Children are more likely than adults to receive medication device instruction, a dose/form/duration change intervention, or a cost-effectiveness intervention. Children are less likely than adults to receive a three-month supply intervention, a medication deletion intervention, or a CMR/A.

Figure 7: Types of Interventions Received by Adults vs. Children



N = 33,761 adults and 7,899 children with interventions

Figures 8-A and 8-B show the distribution of MTM recipients by county.

Figure 8-A: MTM Recipients by County

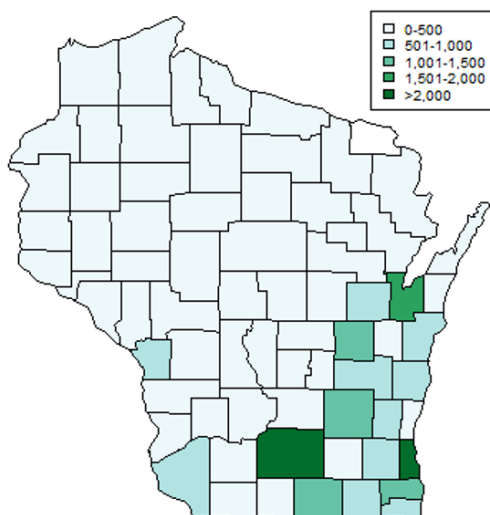
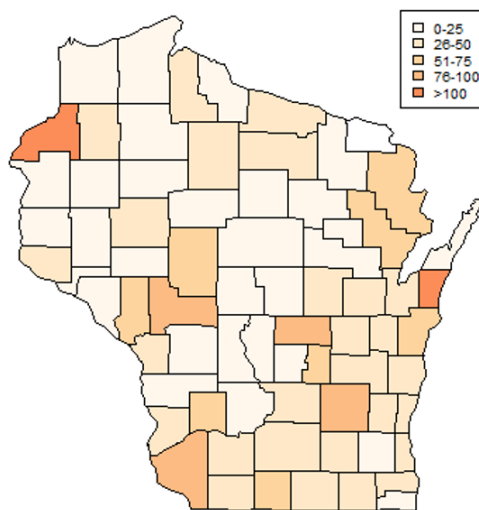


Figure 8-B: MTM Recipients per Thousand ForwardHealth Members by County



N = 41,660 members

Figure 8-A shows that the counties with the highest number of MTM recipients tend to be the counties with the largest populations (notably Milwaukee, Dane, and Brown counties). Figure 8-B, which shows the number of MTM recipients per thousand ForwardHealth members, however, tells a different story. Milwaukee, Dane, and Brown counties actually have fairly low numbers of MTM recipients given their size. And the counties with the highest ratios of MTM recipients to members (Kewaunee and Burnett) have relatively small ForwardHealth populations.

ForwardHealth Delivery Method and Program Type

HMO members account for a little over half of MTM recipients (Figure 9). Medicaid and BadgerCare Plus account for 65 percent of MTM recipients (55 percent BadgerCare Plus, 10 percent Medicaid), with the remainder almost equally split between SSI and SeniorCare (Figure 10).

Figure 9: MTM Recipients by Delivery Method for Non-Pharmacy Services*

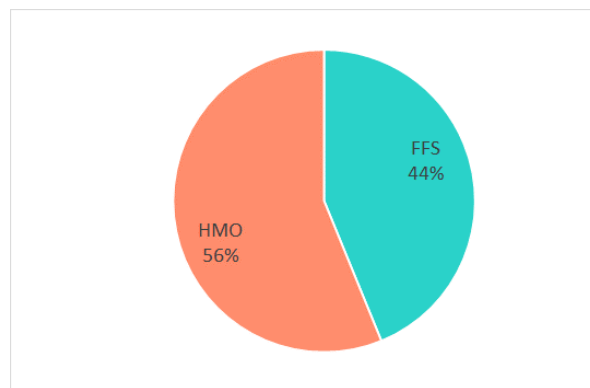
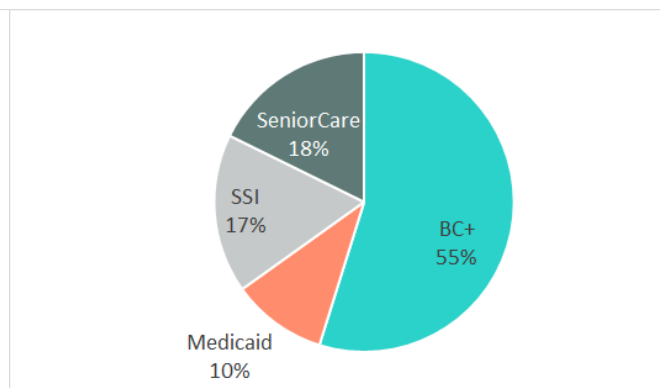


Figure 10: MTM Recipients by Program Type



N = 41,660 members

**At the time of their first MTM intervention*

Table 1 shows the breakout of MTM recipients by each possible combination of program type and delivery method. It includes subtotals by program type (BadgerCare Plus, Medicaid, SeniorCare, and SSI). Most MTM recipients who were in BadgerCare Plus were also in HMOs, while most who were in Medicaid programs³ were fee-for-service members. The fee-for-service/HMO breakout was closer to 50/50 for those on SSI, and all SeniorCare MTM recipients were fee-for-service.

Table 1: MTM Recipients by Program Type and Delivery Method

Program Type and Delivery Method	Members	Pct w/in Subtotals	Pct of Grand Total
BadgerCare Plus fee-for-service	4,198	18%	10%
BadgerCare Plus HMO	18,528	82%	44%
<i>Subtotal BadgerCare Plus</i>	<i>22,726</i>	<i>100%</i>	<i>55%</i>
Medicaid fee-for-service	2,684	63%	6%
Medicaid HMO	1,577	37%	4%
<i>Subtotal Medicaid</i>	<i>4,261</i>	<i>100%</i>	<i>10%</i>
SeniorCare fee-for-service	7,415	100%	18%
SeniorCare HMO	0	0%	0%
<i>Subtotal SeniorCare</i>	<i>7,415</i>	<i>100%</i>	<i>18%</i>
SSI fee-for-service	3,954	54%	9%
SSI HMO	3,304	46%	8%
<i>Subtotal SSI</i>	<i>7,258</i>	<i>100%</i>	<i>17%</i>
Grand Total	41,660		100%

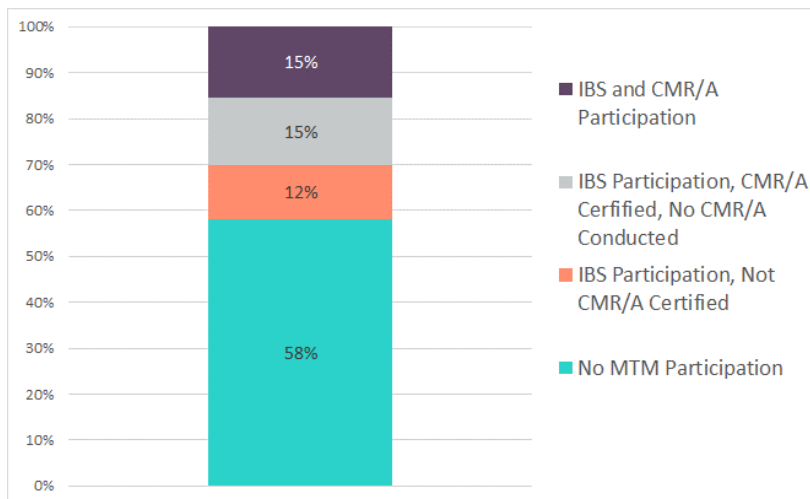
Pharmacy Participation

Number of Pharmacies Participating

Of the 1,311 Wisconsin pharmacies with at least one paid ForwardHealth claim between September 1, 2012, and June 30, 2015, 548 (42 percent) participated in the MTM program. Figure 11 provides a more detailed view of the ways in which pharmacies participated. All participating pharmacies performed one or more IBS interventions. Thirty percent of existing pharmacies at the time of analysis obtained certification from WPQC to perform CRM/As; half of these actually performed a CMR/A.

³The Family Planning Services Only, Medicaid, Medicaid for Foster Care, Medicaid Purchase Plan, Medicaid Purchase Plan Waiver, Medicaid Waiver, and Wisconsin Well Woman Medicaid plans were deemed “Medicaid” for this analysis.

Figure 11: Pharmacy Participation in MTM

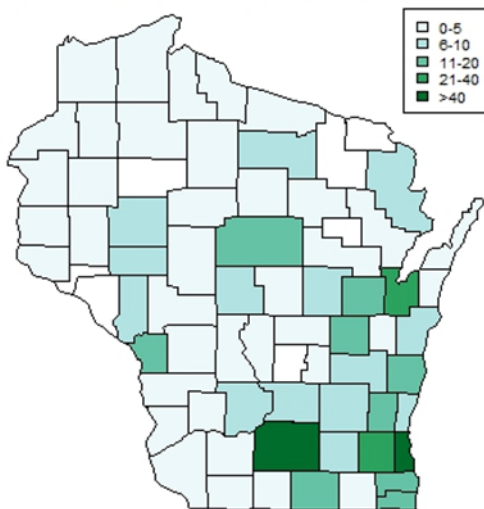


N = 1,311 pharmacies

Geographic Differences in Pharmacy Participation

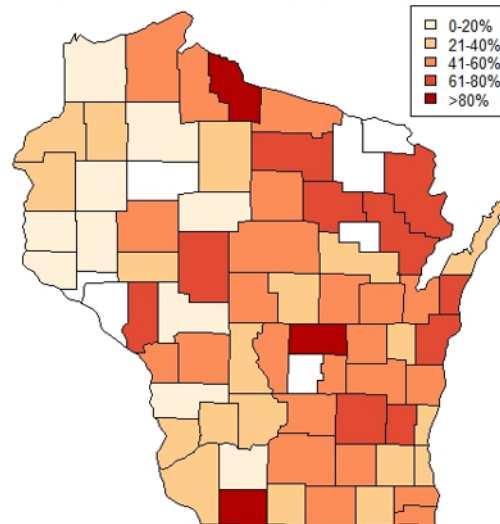
Figures 12-A and 12-B provide two views of pharmacy participation by county. Figure 12-A simply shows the number of participating pharmacies by county, while Figure 12-B shows the percent of ForwardHealth pharmacies in each county that participate in MTM.

Figure 12-A: Participating Pharmacies by County



N = 548 participating pharmacies

Figure 12-B: Percent of Pharmacies Participating by County

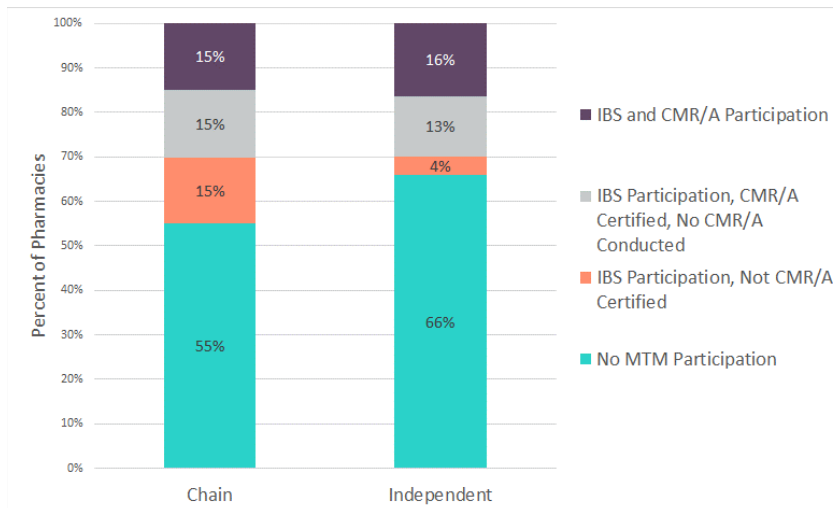


The overall picture is similar to the one provided by Figures 8-A and 8-B, which showed the distribution of MTM recipients by county. When you consider which counties have the most participating pharmacies (Figure 12-A), they tend to be the counties with large ForwardHealth populations (e.g., Milwaukee and Dane). But the percent of pharmacies participating (Figure 12-B) tells a different story. Milwaukee County, which would seem to be a prime candidate for MTM, has a relatively low participation rate. The counties with the highest pharmacy participation rate are relatively low ForwardHealth population counties such as Iron, Waushara, and Lafayette counties.

Chain Versus Independent Pharmacies

Seventy-two percent of all Wisconsin pharmacies that accept ForwardHealth Plans are chain pharmacies.⁴ As shown in Figure 13, chain pharmacies are more likely than independent pharmacies to participate in the MTM program. When independent pharmacies do participate, however, almost all of them obtain a CMR/A certification.

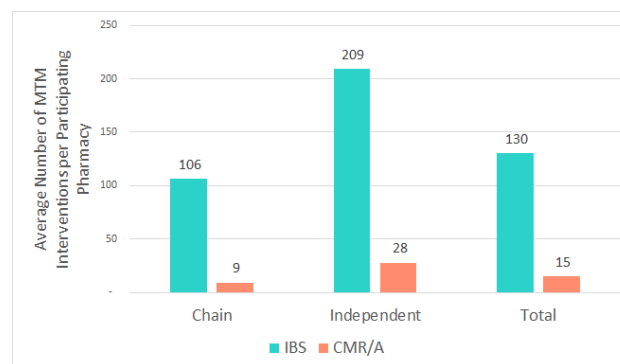
Figure 13: MTM Pharmacy Participation – Chain vs. Independent



N = 939 chain and 372 independent pharmacies

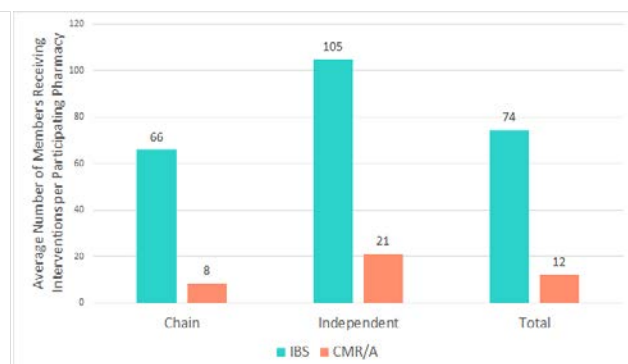
Figures 14-A and 14-B provide further evidence (beyond the last point about CMR/A certification) that those independent pharmacies that do participate in MTM do so more intensely than chain pharmacies.

Figure 14-A: Interventions per Participating Pharmacy – Chain vs. Independent



N = 421 chain, 127 independent, and 548 total participating pharmacies

Figure 14-B: Members Served per Participating Pharmacy – Chain vs. Independent



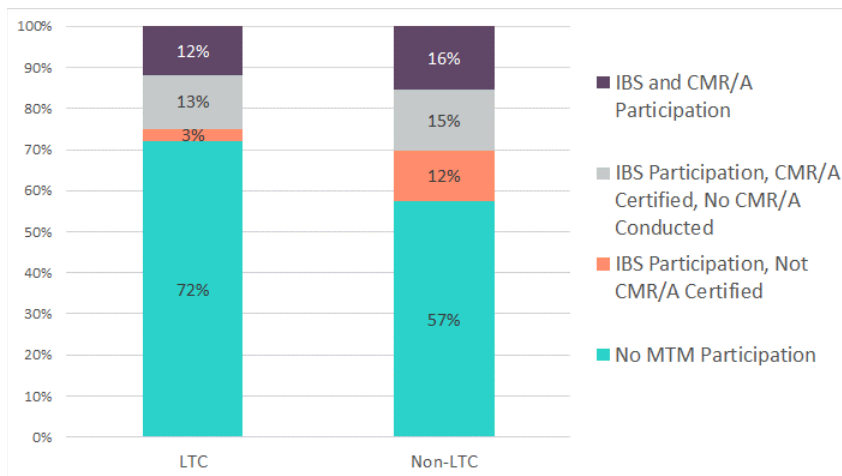
Those independent pharmacies that participate in MTM have delivered far more interventions to far more members (on a per-pharmacy basis) than chain pharmacies.

⁴A pharmacy was deemed to be a chain pharmacy if it had four or more locations (provider IDs) associated with the same tax ID.

Long-Term Care Pharmacies

Of the 1,311 Medicaid-enrolled pharmacies, 68, or 5 percent, primarily provide services to patients in LTC facilities.⁵ As seen in Figure 15, LTC pharmacies are less likely than non-LTC pharmacies to participate in the MTM program. When they do participate, they are more focused on CMR/As than their non-LTC counterparts. This is because MTM policy limits what can occur in a LTC setting.

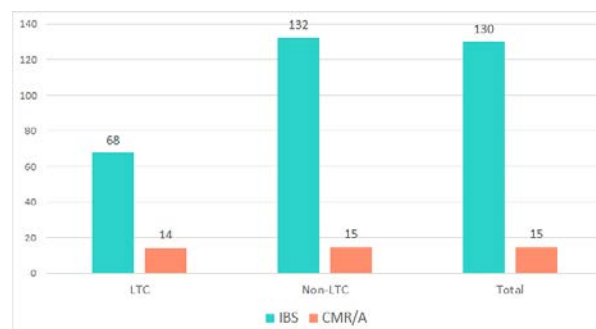
Figure 15: MTM Pharmacy Participation – LTC vs. Non-LTC



N = 68 LTC and 1,243 non-LTC pharmacies

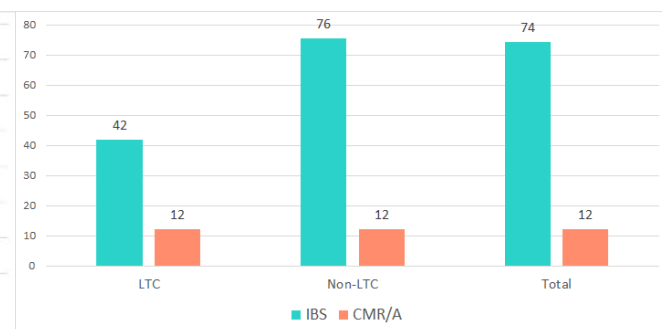
Figures 16-A and 16-B echo the LTC focus on CMR/As seen above. The average participating LTC pharmacy has delivered fewer IBS interventions to fewer members than their non-LTC counterpart, but there is no difference in the number of CMR/A interventions they have delivered or members they have served.

Figure 16-A: Interventions per Participating Pharmacy – LTC vs. Non-LTC



N = 19 LTC, 529 non-LTC, and 548 total participating pharmacies

Figure 16-B: Members Served per Participating Pharmacy – LTC vs. Non-LTC



⁵Pharmacies were deemed to be LTC pharmacies if half or more of their paid pharmacy claims between September 1, 2012, and June 30, 2015, were for members who resided in LTC facilities (nursing_home_ind = Y).

Program Effectiveness

Effectiveness Metrics

The analysis considered several possible measures of program impact.

Changes in Claims Volume or Cost

A reduction in one or more categories of claims could indicate improvements in member health, while reductions in overall claim costs would represent a cost-effectiveness victory.

Increase in Percent of Drugs that are Generic

To determine whether the MTM program succeeded in converting brand prescriptions to generic, the difference in how the percentage of all drugs being taken that were generics changed from the 12 months prior to the intervention to the 12 months following. None of the changes observed were statistically significant, however, and this metric will not be discussed further in the report.

Conversion to Three-Month Supply

To assess the potential impact of MTM on converting 30-day to 90-day prescription fills, all of the 90-day conversion opportunities were identified within the intervention and control groups. A conversion opportunity was defined as any drug where the member had 11 to 13 claims during the 12 months before the intervention and was still taking the drug during the 12 months after the intervention.

To count as a successful conversion, the member had to have three to five claims during the 12 months following the intervention and a dispensed quantity that is a multiple of 90.

Thus, a 90-day conversion rate of 2 percent would mean that 2 percent of all the conversion opportunities were successfully converted to 90-day supplies as defined above.

Use of Control Group

Regardless of the metric in question, assessing potential impacts of MTM requires finding changes from the pre-intervention period to the post-intervention period. But it also requires being able to attribute those changes to the MTM program rather than to extraneous variables like rising healthcare and drug costs or changes in members' health that are unrelated to the intervention. Making this attribution requires the use of a robust control group.

The purpose of a control group is to allow us to observe a nearly identical group of members over the same time period as the MTM recipients and be able to say this is what would have happened without an MTM intervention. To accomplish this, it is important that the control group be as similar as possible to the intervention group on the variables that make MTM recipients different from other ForwardHealth members. The details of how the control group was constructed and validated are included in the appendix.

Since 2012, total cost for ForwardHealth pharmaceutical drugs has increased 40 percent, or 9 percent on an annual basis (CAGR), with the majority of that increase coming in 2014 and 2015. Cost per recipient has increased 45 percent, or 10 percent on an annual basis. Using a control group helps mitigate the effects of cost inflation because the control group feels the same increase in their drugs' costs, which has also been controlled by rate region. Any costs above and beyond that the intervention group incurs over the control group are an effect of the MTM program.

Impact on ForwardHealth Costs

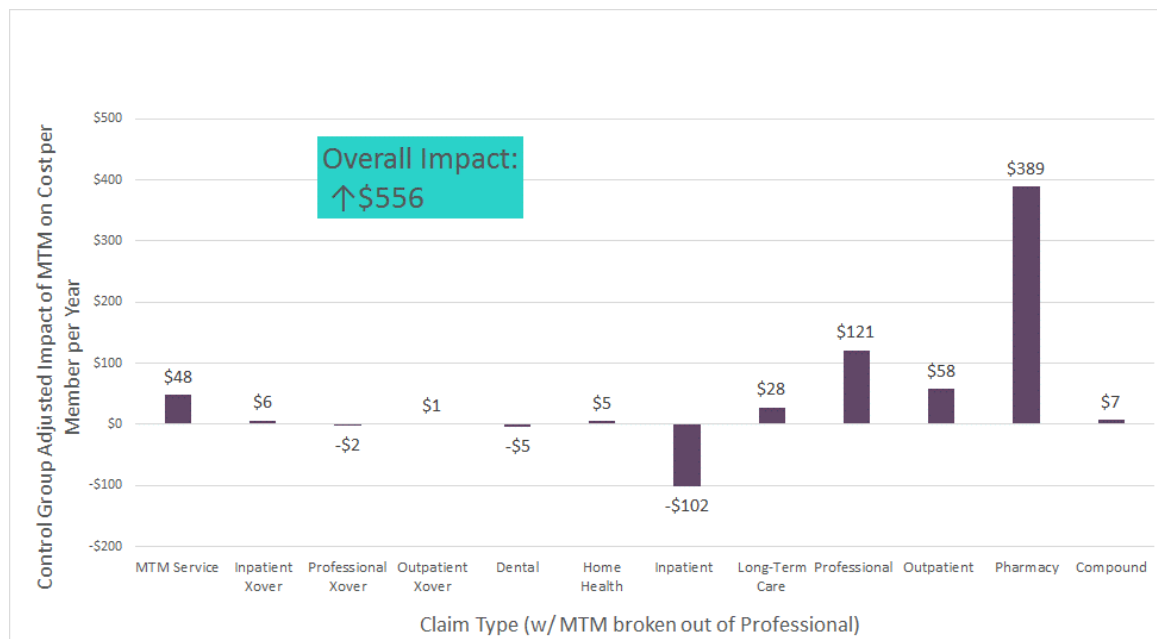
Overall, the MTM program has increased rather than reduced ForwardHealth costs, at least to date. It has, however, produced a substantial reduction in inpatient costs, which suggests an overall improvement in member health.

Figure 17 shows the control group adjusted changes from the pre-intervention to post-intervention period for claim costs. Cost changes are per member and per year and are broken out by claim type (MTM service costs are broken out separately from other professional service costs).

Overall, the MTM program increased costs by \$556 per member per year more than would have been expected based on the observed changes in the control group's costs. This is primarily driven by an increase of \$389 in pharmacy costs. Increased pharmacy costs are an anticipated side effect of the MTM benefit given that one of its purposes is to convince members who are not taking their medications regularly to adhere to their drug regimen.

The one area where MTM caused a reduction was inpatient costs, which are \$102 per member per year lower than would have been expected based on control group performance. This reduction is the strongest indication that the program is improving member health.

Figure 17: Impact of MTM on Claim Costs per Member per Year



N = 41,660 members receiving MTM interventions

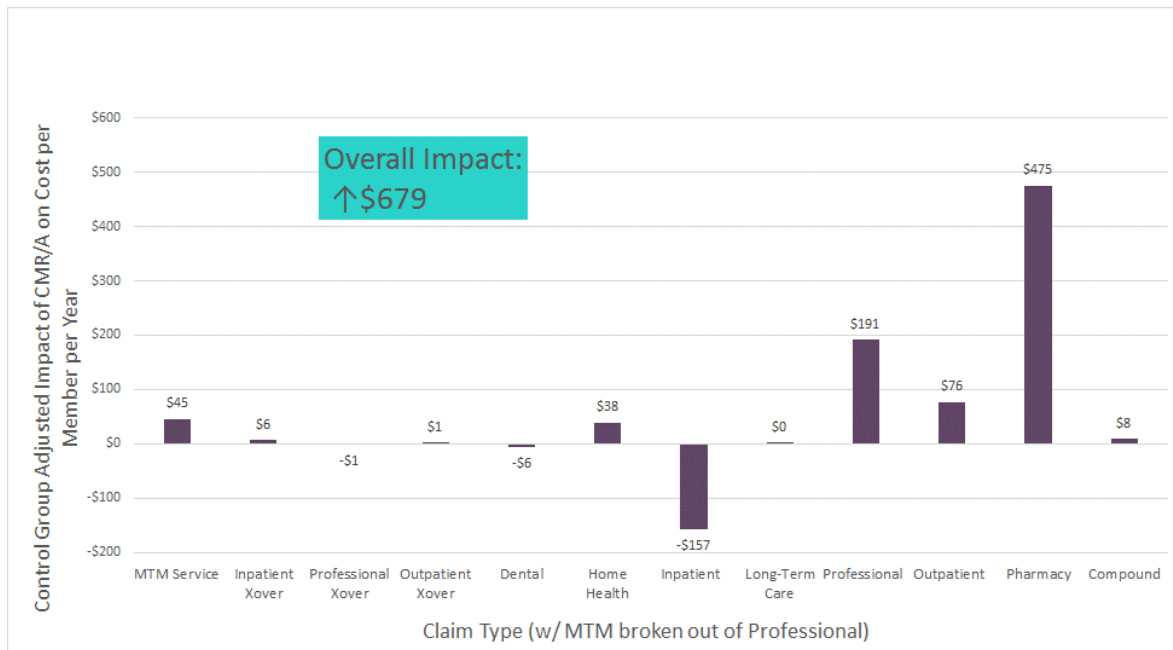
One factor potentially obscuring the impact of the MTM program is the presence of SeniorCare members among intervention recipients. Because SeniorCare members receive only pharmacy benefits through ForwardHealth, there is not a reliable way to assess MTM's impact on their non-pharmacy costs.

To remove this potentially confounding factor, the impact on claim costs with SeniorCare members was excluded.⁶ As seen in Figure 18, looking solely at non-SeniorCare members, the data reveal the same overall pattern of cost

⁶A member was deemed to be SeniorCare for this purpose if they were enrolled in SeniorCare on the date of their first MTM intervention. Many of them were on other benefit plans for parts of the pre-intervention and post-intervention periods.

impacts but with slightly larger dollar values. The net impact is an increase of \$679 per member per year, with a pharmacy increase of \$475 and an inpatient decrease of \$157.

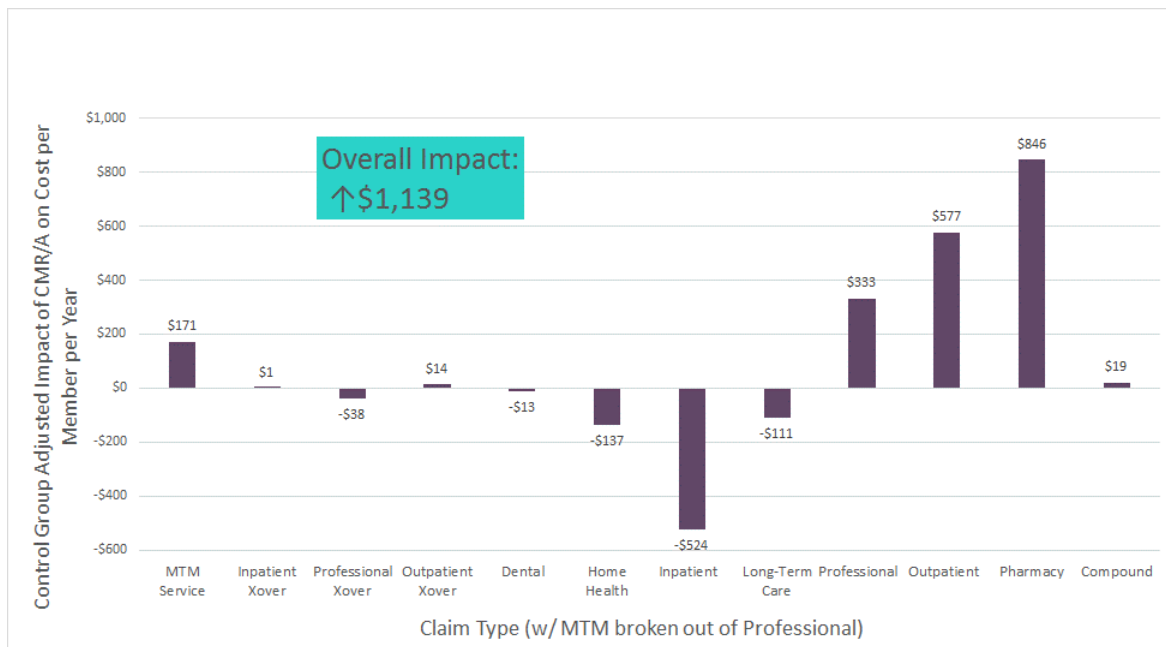
Figure 18: Impact of MTM on Claim Costs per Member per Year – Excluding SeniorCare Members



N = 34,225 non-SeniorCare members receiving MTM interventions

Figure 19 focuses specifically on recipients of CMR/As. The impact of MTM on costs for this group is similar to the impact for MTM recipients overall, but the changes are more pronounced. Overall, costs for CMR/A recipients increased by \$1,139 per member per year versus \$556 for MTM recipients in general. As with the overall MTM population, CMR/A members show substantially reduced inpatient costs (-\$524 per member per year), which are offset by higher pharmacy, professional service, and outpatient costs.

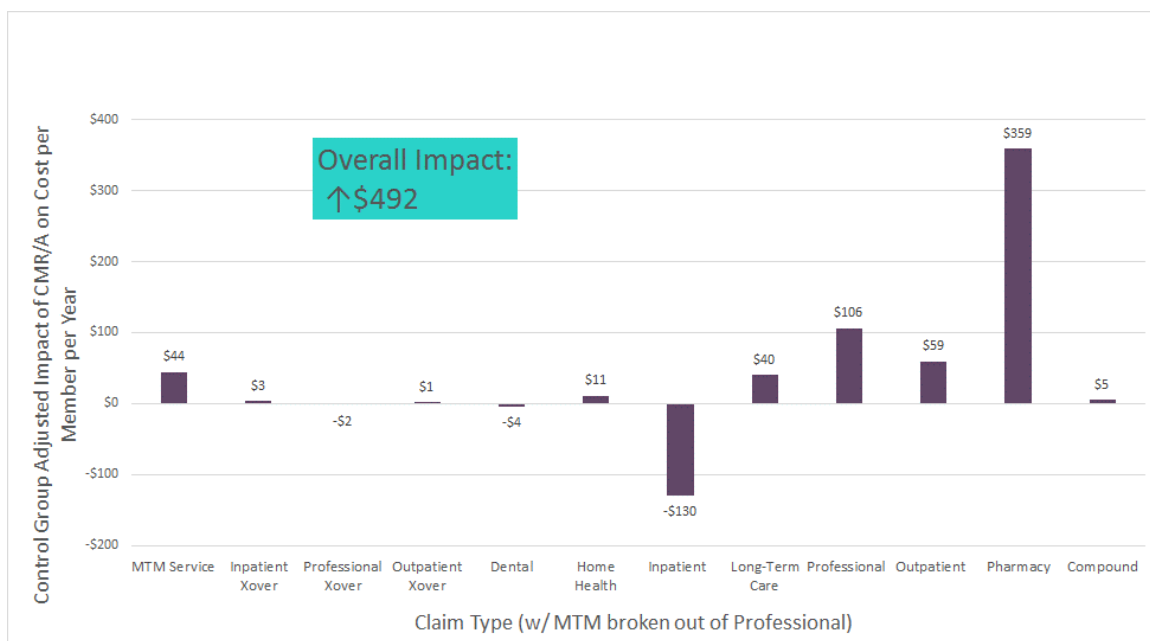
Figure 19: Impact of CMR/A on Claim Costs per Member per Year



N = 2,356 members receiving CMR/As

Figure 20 focuses specifically on recipients of IBS interventions. The impact of MTM on costs for this group is similar to the impact for MTM recipients overall. Overall, costs for IBS recipients increased by \$492 per member per year versus \$556 for MTM recipients in general. As with the overall MTM population, IBS members show reduced inpatient costs (-\$130 per member per year), which are offset by higher pharmacy, professional service, and outpatient costs.

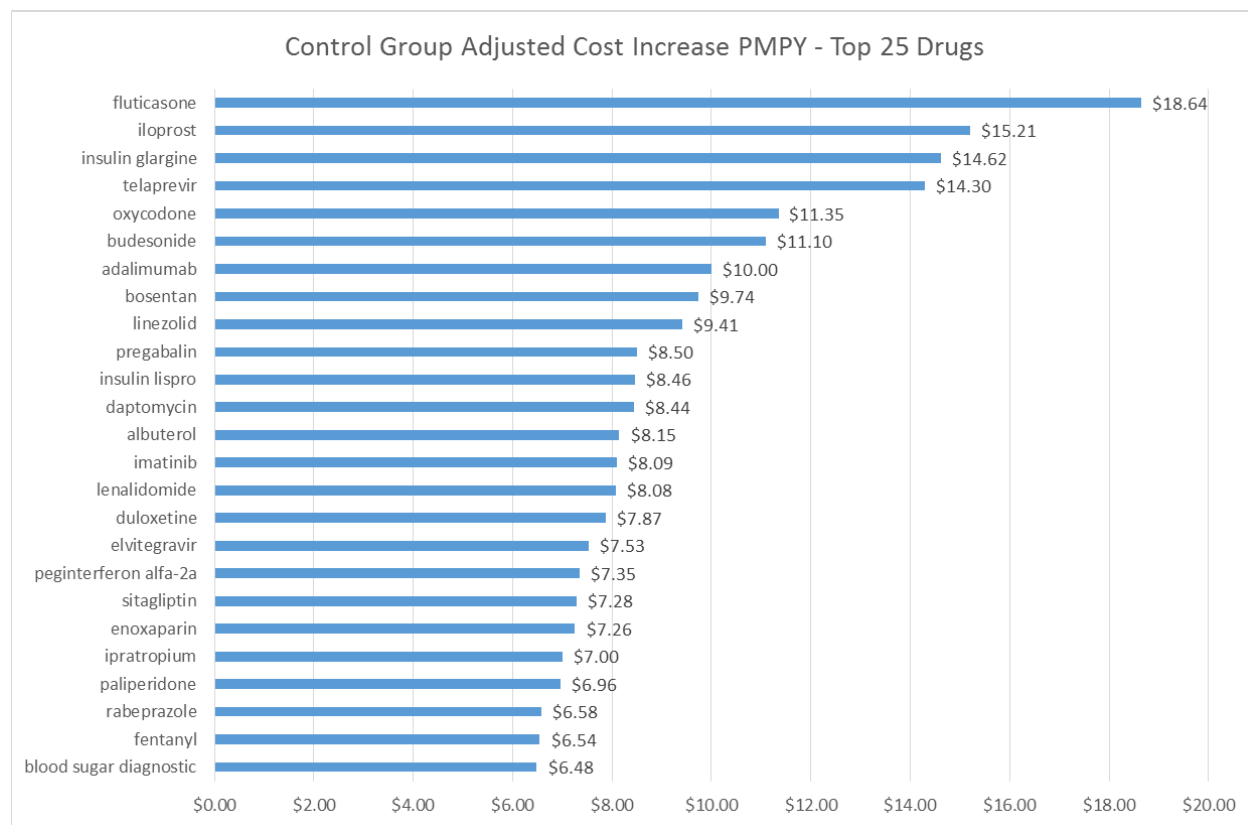
Figure 20: Impact of IBS on Claim Costs per Member per Year



N = 39,304 members receiving IBS

The 25 drug ingredients with the largest increase in annual cost (control group adjusted) after MTM interventions are shown in the Figure 21 below. The largest single contributor to the increase in pharmacy costs is fluticasone. MTM recipients cost the program an additional \$18.64 per member per year for this drug after MTM intervention. Altogether, the top 25 drug ingredients account for an increase of \$235 per member per year in pharmacy costs, or 60 percent of the total cost increase shown in Figure 18.

Figure 21: Impact of MTM on Pharmacy Costs per Member per Year for Specific Drug Ingredients (HIC4)



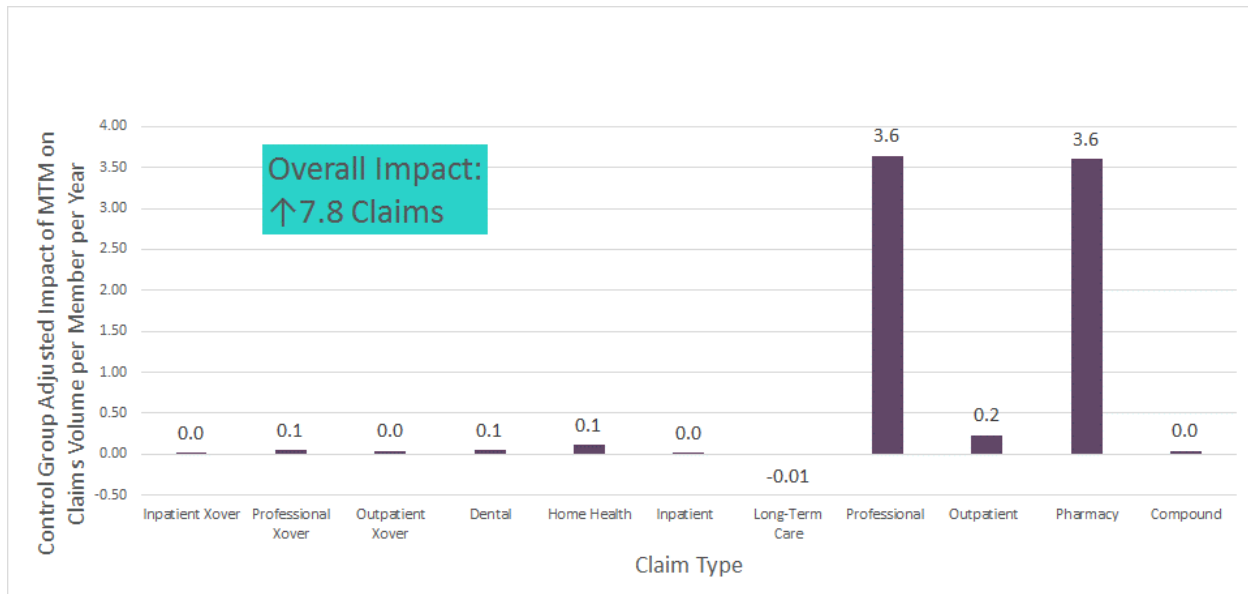
N = 41,660 members receiving MTM interventions

Impact on Claims Volume

Figure 22 shows the effect of MTM interventions on claims volume. The volume of most claim types are unaffected, while pharmacy and professional service claims both increase – driving an overall increase of just under eight claims per member.

The fact that inpatient claim volume is not reduced while claim costs are lowered implies that MTM recipients are being admitted to the hospital at the same rate as they would have been without the program but that their cases are less acute when they are admitted.

Figure 22: Impact of MTM on Claims Volume per Member per Year*

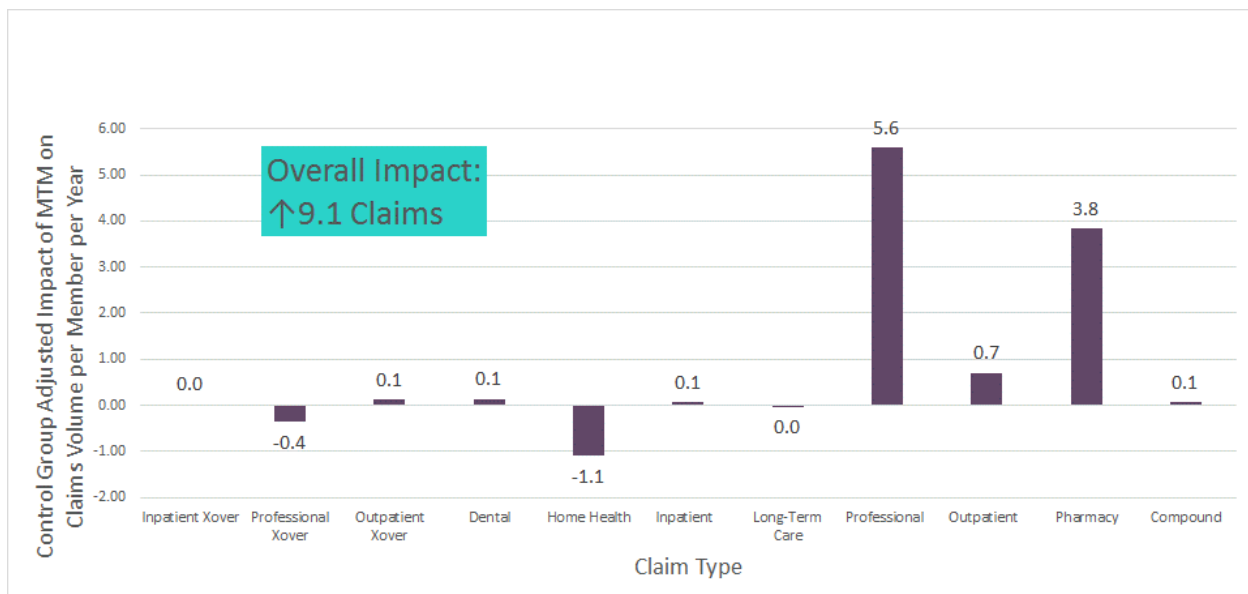


N = 41,660 members receiving interventions

*Includes both fee-for-service claims and HMO encounters

Figure 23 shows the impact of CMR/As on claims volume. The net increase in claims (9.1) is larger than it was for the program as a whole and is once again driven by pharmacy and professional services. However, there is a reduction of roughly one home health care claim per member.

Figure 23: Impact of CMR/A on Claims Volume per Member per Year*



N = 2,356 members receiving CMR/As

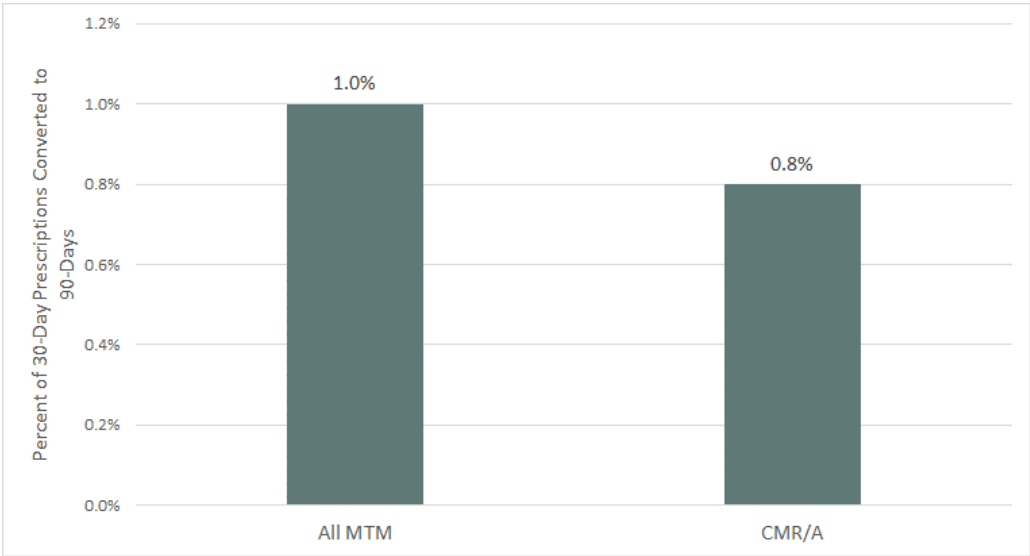
*Includes both FFS claims and HMO encounters

Impact on 90-Day Supply Conversions

Figure 24 examines the impact of the MTM program on converting prescriptions from 30 to 90 days. On a control group adjusted basis, MTM interventions result in a 1 percentage point increase in the rate of 90-day conversions. Without MTM, based on control group performance, 1.9 percent of conversion opportunities were successfully converted. Instead, MTM recipients converted 2.9 percent of their 30-day supplies to 90 days.

Note that the slightly smaller impact of CMR/As on 90-day conversions (0.8 percent) is not statistically significant due to the smaller sample size for CMR/A recipients.

Figure 24: Impact of MTM on 90-Day Supply Conversions



N = 41,660 members receiving interventions and 2,356 members receiving CMR/As

Conclusions and Next Steps

The short-term impact of the MTM program has been a net increase in ForwardHealth costs as increasing drug costs resulting from greater adherence to medication regimens offset lower inpatient costs. But if the program is leading to improved patient health (as suggested by the inpatient cost reductions), it is likely to result in longer-term savings that would not have been noted within the relatively short time frame of the current analysis. Thus, it would be valuable to continue tracking the impact of MTM interventions on health and cost metrics over time.

Another hypothesis worth testing in future research is that the program’s cost-saving impact may be focused on a subset of intervention recipients with particularly severe health problems. A study that compared overall morbidity, specific health conditions, and specific drugs (or therapeutic classes) with downstream cost savings might suggest ways to more effectively target the program.

In addition, interviews with pharmacies might shed light on the barriers to greater program adoption.

Appendix: Control Group Construction and Validation

Identifying Key Variables

A machine learning algorithm was used to extract the most important features separating MTM recipients from other members. The experimental design looked at the demographics, drug costs, drug claim frequency, unique drugs, and unique procedures of 2,000 randomly selected MTM participants. Those were then compared to a randomly selected group of 2,000 ForwardHealth members who had been receiving drugs but had no MTM interventions.

A tree-based machine learning ensemble method, called a Random Forest, was used to determine which of the thousands of variables were most important to build the control group. The Random Forest was used because the data is highly imbalanced and has high dimensionality. The Random Forest technique divides the data into random subsamples of observations and variables and produces thousands of decision trees that strive to most efficiently separate the MTM group from the average member.

To extract the important variables, a measure of reduction in Gini Importance was used that measures how much worse the trees separate the data if the variable in question is removed. Fortunately, the most important variables were also highly intuitive; those selected were drug costs, drug claims, unique number of drugs, and age of the recipient.

Building the Control Group

Now that the features were known, a control that looked identical to the MTM group across drug costs, drug claims, unique number of drugs, and age at date of first intervention was to be built. For ease of interpretation, these features were broken into quartiles. For example, the lowest 25 percent of drug claims fell between one and 16 claims in the one-year pre-intervention period.

Table 2: Quartiles Derived from MTM Intervention Group

	1 ST Quartile	2 ND Quartile	3 RD Quartile	4 TH Quartile
Age	< 28	28 to 45	46 to 67	68+
Total Drug Payments*	< \$262	\$262 to \$1,060	\$1,061 to \$3,402	\$3,403+
Total Drug Claims*	< 17	17 to 35	36 to 63	64+
Total Formulations*	< 7	7 to 11	12 to 17	18+

**In the 12 months prior to the first MTM intervention*

The first step was to pick the pre-intervention period. Initially, the average date of intervention for the MTM group, which is September 4, 2013, was used. This was done because the control group did not have an intervention date, so one had to be assigned to start the process of building the control.

Next, the quartiles were applied and then randomly sampled to maintain the equal proportions falling into the range in question.

Next, intervention dates were modeled for the MTM groups using a multimodal normal distribution because there is some seasonality involved with when the interventions occurred. The modeled dates were then randomly assigned to the control group members. The goal here was that if five MTM recipients had their first intervention on June 24, 2013, the control would also have five recipients with a modeled first intervention date of June 24, 2013.

Next, one year of claims on either side of the modeled intervention date was selected. The process of breaking the data into quartiles was conducted again based on one year from the control group's new modeled intervention date.

Another variable was added into the analysis at this point: rate region. Rate region was included to control for differences in pricing.

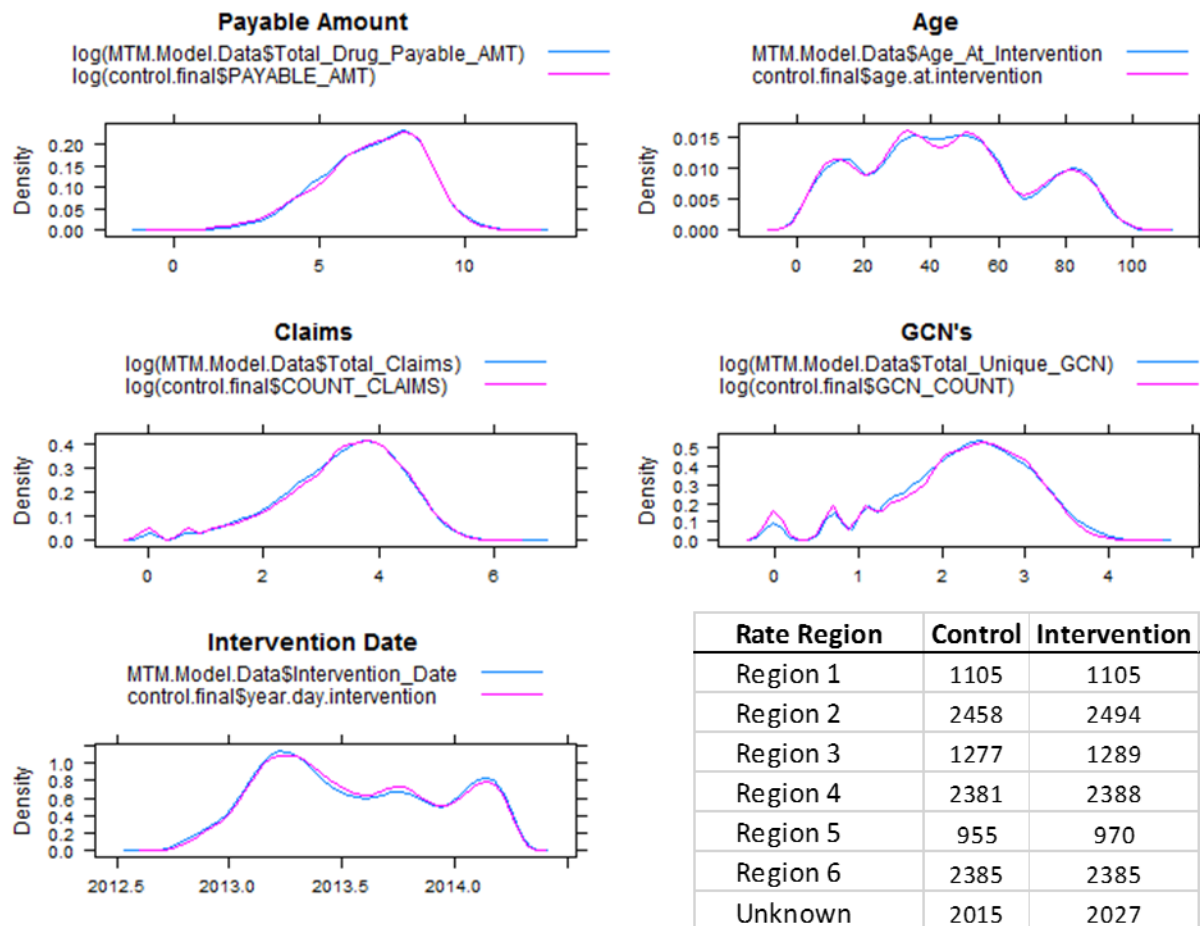
In total, the control group was built on 1,006 unique variations of quartiles and rate regions. There were 12,658 members in the MTM group (members whose first intervention occurred on or before March 31, 2014) and 12,576 in the control. The reason the sample sizes are not identical is because some of the quartile/region combinations lacked sufficient sample size to completely fill out the control group.

This procedure yielded an overall control group. The same procedure was repeated to build separate control groups for MTM members who had a CMR/A.

Validation

Once each control group was built, a comparison to the corresponding intervention group was used to validate that the two groups were highly similar on the variables of interest. In every case they were. The key comparisons are summarized below.

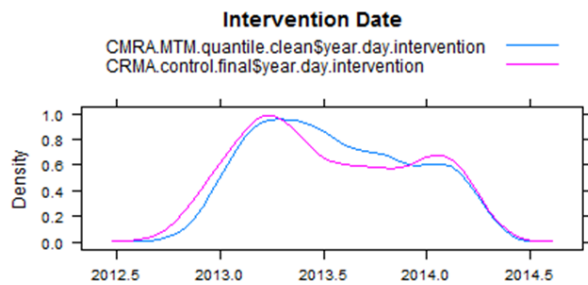
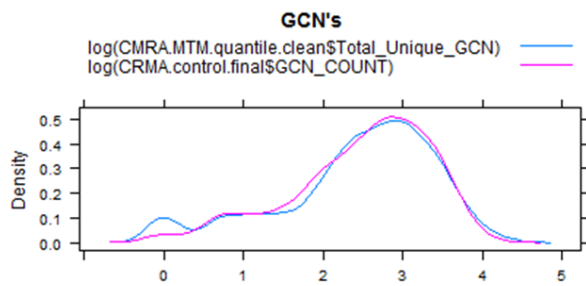
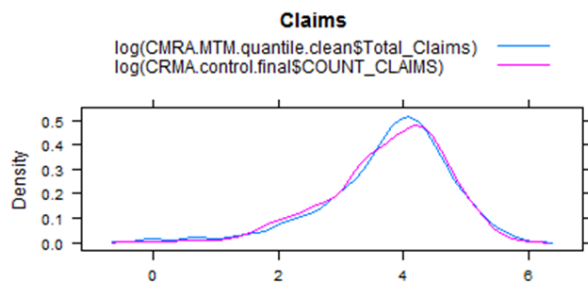
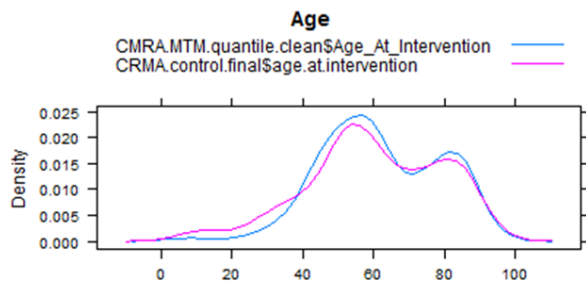
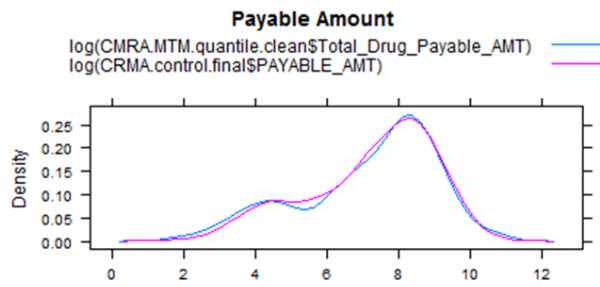
Validation Data for Overall Control Group
(Density plots are log transformed to enhance comparison.)



Pre-Intervention Period

Average Enrollment Months				Control	Intervention
	Pre	Post	% Male		
Intervention	11.9	11.8	30%	N	12,576
% of 12 Months	99.2%	98.5%		% Male	12,658
Control	11.9	11.8	29%	Average Enrollment Months	11.9
% of 12 Months	99.0%	98.0%		Average Amount Payable	3126
				Average Claims	3195
				Average Prescriptions (GCN)	45
				Average Age	12.3
				Average Intervention Date	12.8
					45
					2013.6
					2013.6

Validation Data for CMR/A Control Group



	Control	Intervention
N	465	469
% Male	25%	26%
Average Amount Payable	3967	4183
Average Claims	61	62
Average Prescriptions (GCN)	16.1	16.4
Average Age	60	62
Average Intervention Date	2013.5	2013.7