Impact of a Pharmacist-Based Community Intervention to Improve Outcomes for Patients with Diabetes and Hypertension

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Abstract

Pharmacist-led medication therapy management (MTM) intervention is a process that is designed to optimize outcomes and has been shown to offer significant improvements in the management of chronic disease and promote clinical and economic benefits. A non-randomized study utilizing prospective data was conducted between March 2021 and May 2023 across three clinical sites. Participants were enrolled in MTM services with either a diabetes, hypertension, and/or dyslipidemia diagnosis. Participants completed surveys at baseline, six months, and one year related to demographics, medication adherence, patient satisfaction, and quality of life. Clinical data were collected at baseline and one year, with the primary outcome being the change in Glycated Hemoglobin (HbA1c) and blood pressure. 69 participants were recruited. 52.2% were male and 44.9% rural with a mean age of 60. Mean HbA1c at final follow-up was improved by 0.7% ($p = .001$) with 16 participants improving below an HbA1c of 8% ($p < .001$). 11 participants at final follow-up significantly improved blood pressure below the 140/90 threshold ($p = .012$). Estimated medical cost-care avoidance benefits to patients were $51,948 for HbA1c reductions and $35,277 for participants who lowered their blood pressure. Pharmacist-led MTM interventions can have a significant impact on clinical and economic outcomes related to diabetes and blood pressure.

Keywords: hypertension, diabetes, medication therapy management, pharmacy
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Introduction

In the United States, the prevalence of diabetes was estimated at 8.5% in 2021 and has been growing at an alarming rate, driven by increases in obesity and better detection and diagnoses (Gregg et al., 2004; Parker et al., 2023). The economic burden across the United States due to diabetes is almost $330 billion, with $237 billion for direct medical costs and an additional $90 billion in lost productivity (Lage & Boye, 2020; Parker et al., 2023).

Similar to trends with type 2 diabetes in the United States, diagnoses of hypertension have increased over time, with some estimates of current hypertension ranging from 29% (Wang et al., 2017) to 45% (Otschega et al., 2020; Wang et al., 2017). The economic burden of hypertension within the United States is high, with estimates from 2003 to 2014 indicating that medical expenditures exceeded $130 billion (Dixon et al., 2023).

One patient-centered intervention that has been shown to be successful is Medication Therapy Management (MTM). Medication Therapy Management is designed to optimize patient outcomes with services such as health assessments, medication review, treatment plans, modifying therapy, and enhancing medication adherence (Roosan et al., 2024).

One study that evaluated an MTM pilot program found significant reductions in Glycated Hemoglobin (HbA1c) of 1.5% after 16 weeks (Ndefo et al., 2017). Medication Therapy Management not only improves clinical outcomes but also economic outcomes, such as reduced need for medications, reduced adverse drug events, reduced hospital readmission, and emergency department visits (Deng et al., 2023; Roosan et al., 2024). Additionally, humanistic outcomes, or those related to metrics, such as medication adherence, patient satisfaction with care, and quality of life, have been positively correlated with MTM, diabetes, and hypertensive outcomes (Dalal et al., 2020; Roane et al., 2022; Söylemez & Aşılar, 2023; Vlahovic et al., 2025; Zurita-Cruz et al., 2018).

The purpose of this project was to assess the impact of MTM services on clinical, humanistic, and economic outcomes, as well as to test data gathering among a newly established research consortium. The primary objective within the research consortium was to evaluate changes in HbA1c and blood pressure over 12 months. Secondary exploratory objectives were to examine changes in additional clinical factors, calculate potential economic benefits, and evaluate changes in humanistic outcomes, such as medication adherence, satisfaction with pharmacist-based services, and quality of life. The primary hypothesis was that there would be a positive change in participants' HbA1c, as well as meeting blood pressure targets.

Methods

A non-randomized, single-arm, pre-post model study utilizing prospectively collected data was conducted between March 2021 and May 2023 in collaboration with three clinical partner organizations with sites throughout South Dakota. These consortium sites encompassed both an ambulatory care clinic (site 1) and community pharmacies (sites 2 and 3), with site 1 recruiting two participants and sites 2 and 3 recruiting 35 and 32 patients, respectively. Medication therapy management interventions at each site intentionally varied as follows. Site 1 included patients seen for pharmacist-led medication management. Site 2 and Site 3 included medication review and other clinical services offered by the site, such as medication synchronization and packaging.

Certificate training on MTM was offered by the project team to consortium site pharmacists to ensure consistency in training across sites and reduce bias ("Delivering medication therapy management services"). Project responsibilities, such as recruiting, were shared between consortium partners and the project team. Some consortium sites were able to conduct on-site recruitment, while project personnel recruited for larger clinical sites using sequential patient lists. Patient demographics that were collected included education level, income, rurality, insurance status, and factors such as caffeine and alcohol intake and level of exercise. There were 69 participants enrolled in the project who were receiving an MTM intervention.

Consortium partners conducted all clinical interventions to include lab collections. Project personnel were responsible for study design, database preparation and maintenance, non-clinical patient follow-ups (patient surveys), and data analysis. Inclusion criteria were aged 18 years and older with a diagnosis of diabetes, hypertension, and/or dyslipidemia, or that they are taking a medication for one of these diagnoses and had enrolled in MTM services.

Patient-reported outcomes survey

Those who met the inclusion criteria were invited to participate in the project. Those who enrolled completed a 46-item baseline questionnaire consisting of demographic items related to age, gender, race, income, insurance status, urban vs rural status, and health-related factors, such as smoking and exercise. The questionnaire also included three specific instruments designed to assess patient satisfaction with services (10-item survey), patient-reported medication adherence (12-item survey), and quality of life (12-item survey). Project participants completed follow-up questionnaires at six months and 12 months; however, analysis was only conducted for baseline (n=69) and six-month follow-up (n=25) due to low 12 follow-up responses (n=8).*Clinical outcomes*

Additionally, clinical data were collected by consortium sites at baseline, six months, and 12 months that included values for HbA1c, systolic and diastolic blood pressure, body mass index (BMI), total cholesterol, and glucose. Glycated Hemoglobin was collected as a continuous measure, as well as stratified to a categorical variable of less than or greater than 8.0, with greater than 8.0 consistent with a clinical definition of uncontrolled diabetes (Ndefo et al., 2017). Similarly, systolic and diastolic blood pressure readings were collected as continuous variables and stratified as a categorical variable of less than or greater than 140/90 mmHg, with those having blood pressure readings greater than 140/90 mmHg identified as having hypertension in accordance with the American College of Cardiology/American Heart Association 2017 guidelines for management of blood pressure in adults for stage 2 hypertension. In accordance with established guidelines, hypertension was indicated if either systolic or diastolic values exceeded the recommendations. The primary outcome of interest was the change in HbA1c and hypertension from baseline to 12 months follow-up. Additional analysis related to other clinical factors, economic modeling, and humanistic outcomes was exploratory. Due to inconsistent lab data available at six months, as well as the potential for fluctuation in clinical values that can occur between three and six months, only baseline and 12-month follow-up data were evaluated (Montero et al., 2024). This project was reviewed and approved by South Dakota State University's Institutional Review Board.

Statistical Analysis

Descriptive and inferential analyses were conducted using SPSS, version 29.0 (IBM Corp., Armonk, NY). Variables were evaluated for normality, measures of central tendency and dispersion were reported (mean and standard deviation) for continuous variables, and counts and percentages were reported for categorical variables. Primary analysis for continuous clinical variables, as well as patient satisfaction, medication adherence, and quality of life, was conducted using a paired samples t-test or Wilcoxon signed-rank test. Categorical variables for baseline and final follow-up were analyzed using a related samples McNemar change test to evaluate any change from baseline to the final 12-month follow-up. Due to the small sample size, demographic variables were not analyzed as potential predictors for either baseline or final follow-up outcomes. Prior to analysis, a missing values analysis was conducted, resulting in a Little's MCAR (missing completely at random) test with a p-value of .049. Additionally, pattern analysis supported the likelihood of a MAR (missing at random) data distribution with no significant relationships identified between variables and missingness. The highest percentage of missing data was within the glucose variable at both baseline and 12 months (21.7% and 23.2%, respectively). Primary and secondary clinical variables besides glucose had a maximum of 17.5% of missing data. To reduce potential bias and maintain efficiency, a linear regression-based multiple imputation for missing data within clinical variables was conducted, utilizing a default of five iterations across all primary and secondary clinical variables. Sensitivity analysis was conducted between non-imputed and imputed datasets, with no significant differences found that would impact final outcomes. Power and sample size analysis based on an estimated moderate effect size for change in HbA1c indicated 52 participants would be required for a power of .80.

Instruments

Patient Satisfaction with Medication Management Program (MMP)

The MMP was developed by researchers from the University of Minnesota, as well as clinicians from Minnesota-based healthcare systems. The primary purpose of the MMP is to measure patient satisfaction with medication management services. The MMP is a 10-item instrument with strong reliability and validity (Cronbach's alpha 0.95). This instrument has a possible score from 9-36, with a higher score indicating a higher level of patient satisfaction on three domains (Moon et al., 2015). This instrument was slightly modified for this study to eliminate the word "clinical" before the word "pharmacist" in each question without further altering the original question, which would likely have a negligible impact on reliability and validity.

Adherence to Refills and Medications Scale (ARMS)

The ARMS instrument was developed as a collaborative effort between researchers from Vanderbilt, Brown, Georgetown, and Emory Universities. The survey was designed to evaluate medication adherence and was tested across various levels of patient literacy. The ARMS survey is a reliable and validated 12-item scale typically used within a patient population with chronic disease, with a high internal consistency showing an overall Cronbach's alpha of 0.814. Scores on the ARMS can range from 12-48, with a lower score indicating stronger medication adherence (Kripalani et al., 2009). In addition to an overall score, the ARMS has two distinct subscales available related to self-administering medication and the ability to refill medications.

SF-12

The SF-12 was developed by researchers from the New England Medical Center in Boston, Massachusetts as a faster alternative to the original SF-36. The SF-12 is a reliable and validated instrument designed to assess eight domains of physical and mental health with scores divided into physical component summary scores (PCS) and mental component summary scores (MCS). Test-retest reliability was high when compared to the SF-36 across domains, reaching .890. The SF-12 is a 12-item survey with a possible score ranging from 0-100. A higher score indicates a higher level of physical function and mental/emotional stability (Shah & Brown, 2020; Ware et al., 1996). Individual scores for the PCS and MCS undergo a linear transformation based on a population mean score of 50 and a standard deviation of 10. Those with a score over 50 are considered to have a higher-than-average level of physical or mental health.

Economic modeling

Incremental changes in HbA1c based upon graduated percent changes were used to estimate potential patient-centered cost savings using methods and calculations described in Lage & Boye (Smith et al., 2021). Economic modeling outlined by Smith et al. estimates that patients with just a 1% reduction from HbA1c's >10% to 9% would realize a cost saving of $1,374, 9% to 8% at $1,303, and 8% to 7% at $373.

Additional modeling using a 5% HbA1c comparator as a proxy for "diabetes risk free," and the difference in participant baseline and 12-month follow-up HbA1c was estimated (Benefit-Cost Analysis, 2012).

$$\frac{\text{Median Baseline HbA1c (7.4)} - \text{Median Impact HbA1c (6.9)}}{\text{Median Baseline HbA1c (7.4)} - \text{Diabetes Risk Free (5.0)}} = 20.8\%$$

Blood pressure economic modeling was estimated using methods outlined by Kirkland et al. According to 2018 estimates, hypertension medical expenditures are at $2,565, with that number almost doubled if there is a concomitant diabetes diagnosis ($4,434).

Results

Patient Demographics

The participant sample consisted of 52% male (n=36), 97% Caucasian, and a mean age of 60 (SD=11.4) years, as reported in Table 1.

Clinical Data

Clinical data were obtained for 69 (n=69) enrolled participants for baseline and 12-month follow-up, as shown in Table 2.

There was a clinical and statistically significant difference between baseline and 12-month HbA1c values, showing a strong effect size difference (d=.569), with the mean reduction of 0.7% exceeding the standard for a minimal clinically important difference of 0.5% (Dankers et al., 2021). When stratifying mean HbA1c values by those having an HbA1c higher or lower than a cutoff of 8.0, there was a statistically significant difference in proportions between baseline and 12 months post enrollment with a similar effect size (d=.670), with participants more likely to have an HbA1C <8.0 compared to baseline scores. Additionally, the proportion of participants with HbA1c values >80 was significantly lower at 12 months compared to baseline (6% versus 29%, respectively).

When stratifying participants as having a blood pressure greater or less than 140/90 mmHg, there was a statistically significant difference in proportions between baseline and 12-month follow-up (d=.440), with participants more likely to have a blood pressure value below 140/90 mmHg at 12 months. Between baseline and 12-month follow-up, 11 participants fell below the 140/90 mmHg threshold. Gender was the only demographic variable that was significantly associated with change in 12-month follow-up HbA1c (p=0.047), with more males still having a higher HbA1c at final follow-up.

Humanistic Outcomes

Participants in this survey displayed positive baseline scores in all three primary measures related to patient satisfaction (Patient Satisfaction with Medication Management Program-MMP*)*, adherence (Adherence to Refills and Medication Scale-ARMS), and quality of life (SF-12). Results pertaining to changes in the humanistic outcomes of medication adherence, patient satisfaction, and quality of life are presented in Table 3. None of the changes from baseline to six-month follow-up was significant.

Economic Modeling

Based on the economic modeling of Smith et al., participant HbA1c reductions from baseline to 12 months would result in potential overall healthcare savings of $24,731. This amount is based on two reductions to 9% ($2,748), three reductions from 9% to 8% ($3,128), seven reductions >2% ($10,949), and 17 reductions from 8% to 7% ($6,341). Participants in this study achieved a 20.8% overall reduction in diabetes risk, resulting in a cost-avoidance benefit of $51,968 (.208 risk reduction x 69 participants x $3,621 diabetes medical cost

Table 1
Participant Demographics at Baseline

Variables (100%)	**N=69[a]**		
Age M (SD)	60.0 (11.4)	**Frequency of Alcohol Intake**	
Gender			
Male	36 (52.2)	Monthly or less	21 (48.8)
Female	33 (47.8)	2-4 times per month	10 (23.3)
Race		2-3 times per week	8 (18.6)
White	67 (97.1)	4 or more times er week	4 (9.3)
Other	2 (2.9)	**Alcohol Intake on a Typical Day**	
Education Level[b]			
Did not graduate HS	4 (5.8)	1 or 2	16 (38.1)
HS graduate or GED	32 (46.4)	3 or 4	22 (50.0)
2-year degree	15 (21.7)	> 5 drinks	5 (11.9)
4-year degree	8 (11.6)	**Frequency of Caffeine Intake**	
Graduate degree	7 (10.1)		
Household Income		Monthly or less	3 (4.8)
< $20,000 per year	9 (13.0)	2-4 times per month	3(4.8)
> $20,000 per year	58 (84.1)	2-3 times per week	9 (14.5)
Geographic area		4 or more times per week	47 (75.8)
Rural	31 (44.9)	**Caffeine Intake on a Typical Day**	
Urban	38 (55.1)		
Insurance[c]		1 or 2	42 (67.7)
Private insurance	24 (34.8)	3 or 4	16 (25.8)
Other/Government	51 (73.9)	> 5 drinks	4 (6.4)
Smoking		**Minutes of physical activity/week**	
No	54 (78.3)	< 150 minutes	42 (60.9)
Yes	14 (20.3)	> 150 minutes	25 (36.2)
		Specific targeted exercise/week	
		< 3 days	51 (73.9)
		> 3 days	16 (23.2)

M=Mean, SD=Standard Deviation, HS=High School, GED=General Education Development
[a]Numbers may not equal 100% due to missing data
[b]Early respondents did not receive this question
[c]Numbers may not equal 100% due to combined options

Table 2
Participant Clinical Outcomes from Baseline to 12 Months Follow-Up (N=69)

Variables	Baseline	12-Months	P Value[a,b]
HbA1c (M, SD)[a]	7.6 (1.5)	6.9 (0.89)	**0.001**
HbA1c < OR >8.0[b]			
<8.0	49 (71.0%)	65 (94.2%)	**< 0.001**
≥8.0	20 (29.0%)	4 (5.8%)	
Systolic BP (M, SD)[a]	126.9 (21.7)	126.8 (11.1)	0.992
Diastolic BP (M, SD)[a]	75.6 (10.5)	76.7 (9.1)	0.567
Blood Pressure 140/90 mmHg[b]			
<140/90 mmHg	50 (72.5%)	61 (88.4%)	**0.012**
≥140/90 mmHg	19 (27.5%)	8 (11.6%)	
BMI (M, SD)[a]	34.6 (9.9)	36.3 (10.7)	0.187
Total Cholesterol mg/dL (M, SD)[a]	156 (42)	159 (31)	0.450
Glucose mg/dL (M, SD)[a]	135 (39)	135 (33)	0.969

HbA1c=Glycated HemoglobinM=Mean
SD=Standard Deviation
BP=Blood Pressure
BMI=Body Mass Index
[a]Wilcoxon Signed Rank Test
[b]Related Samples McNemar Change Test

Table 3
Participant Humanistic Outcomes from Baseline to 6 Months Follow-Up

Variables	Baseline (N=69) (M, SD)	Baseline (N=25) (M, SD)	6-months (N=25) (M, SD)	P Value[c,d]
ARMS[a] (Possible Score 12-48)	16.6 (3.8)	16.9 (3.9)	16.3 (3.0)	0.272
MMP[b] (Possible Score 9-36)	29.8 (4.5)	28.9 (3.9)	30.5 (4.1)	0.134
SF-12[b]				
PCS (Possible Score 0-100)	40.7 (10.9)	37.9 (10.6)	39.9 (10.1)	0.122
MCS (Possible Score 0-100)	46.6 (10.2)	46.9 (10.1)	46.4 (10.2)	0.925

ARMS = Adherence to Refills and Medication Scale
MMP = Patient Satisfaction with Medication Management Program
PCS = Physical Component Score
MCS = Mental Component Score
[a]Lower score more beneficial
[b]Higher score more beneficial
[c]Wilcoxon Signed Rank Test
[d]Analysis conducted on paired completers only

adjusted for inflation). For the 11 participants in this project who reduced their blood pressure below the 140/90 mmHg threshold, there is the potential to reduce hypertensive-related medical costs for a total of $35,277 adjusted for inflation.

Discussion

This project, consistent with similar research, demonstrates the potential impact that pharmacists and MTM services can have on patient outcomes, including those related to chronic disease in community and ambulatory care settings (Dunn et al., 2015). For diabetes and hypertension specifically, our positive results show that pharmacists can be an important partner in a multidisciplinary management team (Shi et al., 2023). This study further demonstrates that, in relation to diabetes and hypertension management, pharmacist engagement can positively impact clinical, economic, and humanistic outcomes (Deng et al., 2023; Manganelli, 2016). Even in this small sample, we saw the positive clinical impact of pharmacist-led MTM for patients with diabetes and hypertension, which also directly correlates to positive economic impacts.

Clinical Impact

Previous pharmacist-led MTM studies have demonstrated positive clinical benefits in patients with diabetes. Many participants in this study were able to make clinically significant gains in achieving healthier HbA1c outcomes, which has the potential to lead to overall diabetes risk reduction and cost savings (Smith et al., 2021).

While almost three-fourths of participants in this study were at or below the cut-off values for stage 2 hypertension, a significant reduction in the proportion of participants who fell below cut-off values was still achieved at 12 months follow-up. This type of pharmacist-led guidance related to the management of hypertension is well documented within the literature, with pharmacists having an instrumental impact on reducing patient hypertension. For example, one large meta-analysis of 39 randomized controlled trials representing 14,224 patients found a consistent relationship between pharmacist-led interventions and lowered blood pressure, specifically those conducted in community settings (Santschi et al., 2014). Patient education and medication management were two of the three most common interventions reported, both of which are key components of MTM. Within this sample, patient demographics, such as geographic location, education, and income, were not significantly associated with either baseline or final follow-up clinical outcomes, which are inconsistent with usual findings (Dugani et al., 2022; Hill-Briggs et al., 2020).

Economic impact of improving HbA1c and Hypertension

Economic benefits follow from clinical improvements in outcomes. In this study, the total projected economic savings from reductions in HbA1c and hypertension amounted to almost $50,000 for a relatively small sample of just 69 participants. Small changes in clinical outcomes can have significant effects; for instance, a change of just 1% in HbA1c was associated with a 2% reduction in all-cause total health care costs and a 13% reduction in diabetes-related total healthcare costs (Lage & Boye, 2020).

Similar results to those presented from this project can be found in larger sample longitudinal studies. A five-year study utilizing 600 patients that were recruited from six regional employers in Maryland and Virginia found significant reductions in HbA1c and blood pressure over time, and after the costs of the program were subtracted, employers saved $1,031 per beneficiary (Rodriguez de Bittner et al., 2017).

In addition to the economic benefits to the beneficiary and payer related to diabetes, there are economic benefits to achieving target blood pressure levels as well. Pharmacist provided MTM services related to hypertension have been found to be not only clinically effective but also economically beneficial. In one large study, 71% of MTM patients reached blood pressure and cholesterol targets while reducing medical expenditures from $11,965 to $8,197 per person, exceeding the cost of the MTM services by 12 to 1 (Isetts et al., 2008). The sample analyzed in this project, while small, may demonstrate that MTM-enrolled patients can realize significant blood pressure reductions.

Humanistic Impact

While baseline data for both medication adherence and patient satisfaction left little room for improvement, these scores were maintained or saw some improvement over the project period, albeit not significant. At six months, participants continued to exhibit a non-significant change in all humanistic metrics, with a slight improvement in patient satisfaction, which is consistent with other studies related to MTM and patient satisfaction (Cranor et al., 2003). Although our findings did not show an increase in patient satisfaction like other research, our high baseline and six-month scores do reinforce the high level of patient satisfaction for those engaging in pharmacist-based services (Johnson et al., 2008; Malewski et al., 2015). Additionally, our participant sample remained consistent over time regarding medication adherence, likely due to adherence being a major focus of pharmacist-led MTM. Scores indicating a high level of adherence at baseline and final follow-up may have been a key component in the statistical and clinically significant change observed in clinical outcomes. Adherence has been well-identified as a key component in the successful management of chronic disease, including lowering of HbA1c (Cramer, 2004; Nelson et al., 2024).

Limitations

There were some limitations with this project. While the project was able to recruit enough patients to meet power for a pre-post design, subsequent loss to follow-up impacted the ability to do more advanced longitudinal predictive modeling. One consortium site was unable to recruit patients due to a large volume of non-English speaking patients, which reduced recruiting sites to three. Additionally, the original scope of the project was to conduct a prospective two-year project, but slow recruitment impacted the time available for final follow-up before the conclusion of the project period. This may have been due to a variety of factors, though it is important to note that recruitment did occur during the COVID-19 pandemic, which had broad impacts on both patients and the healthcare system, including ambulatory clinics and community pharmacists.

Specifically, community pharmacists, other pharmacy staff, and ambulatory care pharmacists were heavily involved with the pandemic response, including but not limited to immunizations, diagnostic testing, prescribing COVID-19 therapeutics, and furnishing supplies to patients while needing to balance routine pharmacist-provided services with a workforce diminished due to their own susceptibility to infection and other restrictions from infection control measures (Pantasri, 2022; Spence et al., 2022). The data available was also limited in that there was little detail available per patient for specific diagnosis codes or prescription medications, the number of MTM visits, and patients were only identified as having a broad diabetes or CVD diagnosis. Another limitation was the absence of a comparator or control group and site-to-site variability of the MTM intervention services. However, it is not uncommon for small pilot or feasibility projects to be conducted without a control group (Harvey, 2018).

Participants in this study exhibited a ceiling effect related to the humanistic outcomes. From baseline to final follow-up, there were high levels of patient satisfaction, adherence, and patient-reported quality of life, but no statistically significant difference. Medication adherence, however, is the focal point of medication review within MTM services, and these participants remained quite adherent, which is often not the case for those with chronic conditions (Kardas et al., 2024). Additionally, while participants enrolled in this longitudinal project are at a minimum maintaining, if not improving, in all metrics, there is insufficient data for more intensive evaluation, such as quality-of-life years adjusted or incremental cost-effectiveness ratios.

Implications for Health Behavior Research

Pharmacists are an often-overlooked potential partner in public health. Community-based pharmacies are uniquely positioned to address broad public health services. It could be argued that when a patient decides to take a medication and take it properly, this can be a very important health behavior. Medication adherence is critical to ensure the medication works as needed, and the community pharmacist, through programs like MTM, chronic disease management, and other health promotion activities, have proven themselves to be robust partners in promoting medication adherence and broader health outcomes (Ogbuagu et al., 2024). In some communities where access to traditional health care is minimal, pharmacists may be the only source of important public health services, such as health screenings, immunizations, counseling, or additional services such as weight loss, nutrition counseling, or tobacco cessation (Goode et al., 2019). With the increased role pharmacists have undertaken, public health professionals should be encouraged to find ways to partner with these professionals, as they are often front-line caregivers for those with chronic disease and other relevant public health issues.

Conclusion

Pharmacist-led medication therapy management has been demonstrated in this project to have a potential impact on participant outcomes. Participants within this small project were able to significantly improve outcomes related to both HbA1c and blood pressure. The effects of the MTM intervention improved not only clinical indicators but likely economic outcomes for the participants. This project highlights the potential positive economic impact that can be demonstrated even with a small patient population. With these initial promising results, additional longitudinal studies should be conducted with larger sample sizes and comparable control groups.

Discussion Questions

The public is often unaware of the actual scope of duties of their community pharmacists. How do some of the programs that pharmacists promote intersect with common public health initiatives?

Medication adherence, which is often a strong component of MTM counseling, was high in this population throughout the study, which may have contributed to the successful results. What could have been some other drivers of successful outcomes for this population?

Ethical Approval: The study was conducted in accordance with the Declaration of Helsinki and approved by the Institutional Review Board of South Dakota State University (IRB-2010012-EXP, October 26, 2020).

Conflict of Interest: The authors have no conflicts of interest to declare.

Author Contributions: Christopher Robbins: Statistical analysis, literature review, editing, and creating tables. Erin Miller: Project oversight, IRB submission, and final editing. Alex Middendorf: Project implementation and final editing. Deidra Van Gilder: Initial manuscript draft editing and literature review. Sharrel Pinto: Project conception, project management, and editing.

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