

TITLE PAGE

Title of project: Impact of MedSync on Medication Adherence Rates in the Rural Patient Population of Eloy, AZ.

Course title: PHPR862 Writing a Research Proposal for A Scientific Study

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ABSTRACT

Specific Aims: To evaluate the impact of medication synchronization programs on adherence rates in the rural population of Eloy, Arizona.

Subjects: Prescription numbers serviced by SunLife pharmacy in Eloy, AZ.

Methods: Deidentified prescription information was collected before and after MedSync implementation. This data included the medication possession ratio (MPR: average number of days per month of medication in the patient's hands) and the type of medication linked to a STARS quality measure disease state (oral diabetes medications, hypertension, and hyperlipidemia.)

Main Results: From 03/2020 to 011/2020, we observed an no significant change in overall adherence from 70.6% to 71.01% ($p = 0.6174$; CI: -1.1578 – 1.1949) and no significant change in adherence for oral diabetes, hyperlipidemia, and hypertension medications 69.72% vs 71.47% ($p = 0.2301$; CI -1.1089 – 4.6089); 69.04% vs 68.16% ($p = 0.9444$; CI – 3.1723 – 3.4063), and 71.83% vs 71.61% ($p = 0.8443$; CI: - 2.4598 – 2.0118), respectively.

Conclusions: Although medication synchronization programs appear to improve adherence rates in previous studies, our evaluation of Eloy, AZ yielded insufficient data and insignificant results. Further studies are warranted in rural populations.

INTRODUCTION

Medication adherence is well-established as a marker for improved health outcomes. (1,2) However, ensuring patient adherence and adequate access to care remains a challenge for health care practitioners. Patients may forget to pick up a prescription, miss physician appointments, or simply lack the resources necessary to drive to locations where they might receive care. Pharmacists remain at the forefront of the ongoing struggle to ensure patient adherence; a struggle made more difficult in an aging population within which patients often suffer from multiple disease states. With complicated health concerns, patients must also manage complicated medication regimens with regards to timing, dosage, food intake, and medication interactions. Often, medical conditions are not diagnosed simultaneously, nor are prescription orders simultaneously initiated. This results in patients making multiple visits to the pharmacy, sometimes on successive days, to remain adherent to their medications. In chronic illness, patients may become desensitized to their condition and delay picking up prescriptions to acquire more than one prescription on the same day, thus saving themselves time and money. To mitigate this issue, programs like MedSync help to ensure that medications are in the patient's hands at scheduled intervals. Not only are the prescriptions automated, but they are also synchronized to fall in line with other chronic medications. By improving the MPR (medication possession ratio) for STARS medications, pharmacists hope to remove barriers to medication adherence and improve health care outcomes for patients with chronic illness. STARS measures are quality improvement markers aimed at measuring pharmacy services via their impact on adherence and patient health outcomes. Our study aims to evaluate the impact of medication synchronization programs, such as MedSync, on adherence rates for chronic conditions of STARS medications in SunLife patients of Eloy, AZ.

METHODS

Design: We performed a pre/post observational study assessing adherence rates for oral prescription medications for hypertension, diabetes, and dyslipidemia in the form of MPR values. The time period ranged from at least 3-6 months before and after Medsync implementation. Overarching adherence rates for the total study population were also assessed.

Subjects: The sample included all active prescription numbers for oral diabetes, hypertension, and dyslipidemia medications. All prescription data was de-identified utilizing SunLife's RxQ program. Approximately 4,000 prescription numbers were included in the study, of which only 0.04% were scheduled with Medsync. Medicare and AHCCCS patients were excluded as they were ineligible for MedSync enrollment. No human subjects were involved in this study, only raw, deidentified data was used.

Measures: Average MPR, or medication possession ratio, is the value used to assess adherence rates before and after MedSync implementation. This value quantifies the availability of individual medications to the patient as well as their ability and willingness to refill medications promptly.

The medication subgroups were broken down into STARS categories for diabetes, hypertension, and dyslipidemia. This provided a clearer picture of chronic disease states in rural populations.

Data Collection: Prescription numbers were obtained through SunLife's RxQ every 6 months and linked to MPR (medication possession ratio), separated by STARS disease states. The de-identified data was securely sent to the research team or retrieved in-person in the form of a digital data file.

Data Analysis: Based on previous work with Sunlife, we estimated a sample size of at least 2,000 prescription numbers (received approximately 4000) to allow for sufficient power to identify an observable difference in adherence rates. Continuous data were analyzed via means and standard deviations, as well as p-values (a-priori: 0.05) and paired t-tests with confidence intervals observed.

RESULTS

As summarized in table 1, very little difference was observed within the study time frame of March 2020 to November 2020. While a slight increase in MPR can be objectively observed, the associated p-values with those changes indicate that the results are not significant for any MPR value across the board. Medications for diabetes make up just over one-fourth of each sample, while hypertension prescriptions comprise roughly half of each sample, and dyslipidemia prescriptions represent less than one-fourth of the study sample. The standard deviations in MPR values remain consistently wide between the data samples as well. No significant results were observed in the overall MPR value nor the subgroups.

DISCUSSION

Given the unfortunately low rate of MedSync scheduled medications (0.04%), the observed values are unsurprising. No significant change was observed for any study value. Roughly 140 prescriptions out of the 4000 prescription numbers received were governed by synchronized and automated refills. The impact of such a small value on overall MPR values was predictably diminished. We had higher hopes for this study. Given the rural setting, we anticipated increased participation and perhaps improved adherence. Based on previous studies which emphasized the importance of adherence on health outcomes, which medications are prone for poor MPR values, and the positive impact of synchronization programs on medication adherence, we hoped to see similar results in this study.

Poor adherence rates lead to poorer health outcomes for the patient due to decreased serum levels below the therapeutic window, as well as withdrawal or rebound reactions. "Poor treatment response ($p < .001$) and low medication adherence ($p = .02$) were independent predictors of discontinuation against medical advice." (2) Poor adherence rates often result from patients not picking up a prescription; an occurrence that can increase when patients have multiple prescriptions requiring

multiple pick-ups. Non-adherence frequently occurs for newly prescribed medications treating chronic conditions such as hypertension (28.4%), hyperlipidemia (28.2%), and diabetes (31.4%). (1) Previous interventions include enrolling patients in 90-day fill programs to minimize the number of pickups. Other programs include home deliveries, mail-order, and medication reconciliation programs. Unfortunately, this does little to address multiple prescriptions prescribed and prepared for dispensing on different days. Patients enrolled in previous medication synchronization program studies (n = 47–81) had adherence rates of 66.1% to 75.5% during 1 year versus 37.0% to 40.8% among control patients. (3)

Other studies show adherence rates are readily correlated with improved health outcomes. The efficacy of medication synchronization programs has also been illustrated in similar studies. However, these studies have previously focused on urbanized populations with greater access to public transportation. We were curious if the often-overlooked rural healthcare system and subsequent patients would benefit in a similar or greater fashion. Rural communities suffer from several socioeconomic health disparities which limit access to care in ways not observed in urban settings. Public transit is high on the list of deficient services in rural communities. Thus, patients who lack their own transportation and have multiple prescriptions on a staggered schedule suffer greater setbacks in collecting their required medications. For example, one SunLife patient received care, but her transportation could not wait for the pharmacy to fill the prescriptions. This resulted in the patient waiting two weeks for an antibiotic due to lack of reliable transportation. Another study illustrates potential benefits of MedSync to rural health care: patients enrolled in the medication synchronization program had adherence rates of 66.1% to 75.5% during 1 year versus 37.0% to 40.8% among control patients. (3,4,5) In our study, the setting is isolated to rural healthcare, in which socioeconomic health disparities often compound the difficulties in ensuring access to care and medication.

Unfortunately, this study was limited by design. We went to great lengths to protect patient health information, which left the data sets stripped of which prescription numbers were associated

with MedSync. We were unable to evaluate those individuals separately. Furthermore, as an observational study, we were not directly involved with enrolling patients in the MedSync program, which limited our ability to encourage a greater participation rate. The program is a voluntary service; patients may elect not to participate at their own discretion. Those patients with less income may have preferred the flexibility of choosing which medications to purchase at different times of the month as funds became available. Adherence rates observed in this study are unique to rural populations served by SunLife clinic and are not generalizable outside the scope of study.

CONCLUSIONS

According to the results of this study, MedSync fails to improve adherence rates in the rural population of SunLife patients in Eloy, AZ for oral diabetes, dyslipidemia, and hypertension medications. The low enrollment rate likely impacted the results, as any observable impact would be diminished among the large sample size. As MedSync participation increases over time, an increase in overall MPR values may be observed, as seen in previous studies. The program warrants further promotion by health care services to elicit a significant benefit to patient adherence. At this time, overall patient adherence rates have not been significantly improved. That being said, the impact of MedSync on the lives and healthcare outcomes of individual patients cannot be discounted.

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Table 1

Mar-May 2020

Row Labels	Average of MPR	StdDev of MPR	Count of Drug Name
Diabetes Mellitus	69.71855761	33.5402315	1137
Dyslipidemia	69.03901895	34.34680068	897
Hypertension	71.83217131	34.7228506	2008
Grand Total	70.61776348	34.32403938	4042

Sep-Nov 2020

Row Labels	Average of MPR	StdDev of MPR	Count of Drug Name
Diabetes Mellitus	71.46884273	33.93388692	1011
Dyslipidemia	69.15595238	35.537329	840
Hypertension	71.60766325	36.12418414	1853
Grand Total	71.0137689	35.41025443	3704

Row Labels	P-Value	CI
Diabetes Mellitus	0.2301	(-1.1089-4.6089)
Dyslipidemia	0.9444	(-3.1723-3.4063)
Hypertension	0.8443	(-2.4598-2.0118)
Overall Adherence	0.6174	(-1.1578-1.9498)

APPENDICES

Data Collection Form

Original Name	Variable
MedSync (before and after)	1- after, 0 - before
Insurance (cash, government, private)	0 – cash, 1 – government, 2 - private
MPR (0-10, 11-20, 21-30, 31-40, 41-50, 51-60, 61-70, 71-80, 81-90, 91-100)	0 – 0-10, 1 – 11-20, 2 – 21-30, 3 – 31-40, 4 – 41-50, 5 – 51-60, 6 – 61-70, 7 – 71-80, 8 – 81-90, 9 – 91-100
Typical Indication (diabetes, Hypercholesterolemia, asthma/COPD, blood pressure, all others)	1 – diabetes, 2 – dyslipidemia, 3 – asthma/COPD, 4 – Antihypertensive, 5 – all others

Codebook

Key
Diabetes oral
Dyslipidemia
Antihypertensive
Other
Non-Applicable

Workplace instruction:

The image shows a screenshot of a software interface titled "MedSync Update Confirmation" from Sun Life Family Health Center. The interface includes a header with the center's logo and name. Below the header, there is a confirmation message: "You have selected to sync this script to the Med Sync Program". The form contains several fields: "Program Name" (3 - Enrolled in Plan 1 but not in sync), "Next Sync Date" (11/23/18), and a section for short filling with "Old Qty Dispensed" (30), "New Qty Dispensed" (21), "Old Days Supply" (30), and "New Days Supply" (21). At the bottom, there are four buttons: "Sync by Short Filling", "Don't Short Fill but Keep on MedSync", "Cancel Fill and Fill on Next MedSync Date", and "Remove Prescription from MedSync".

Callout boxes provide instructions for each field and button:

- Program Name:** Identifies if the patient is enrolled and the status of their prescriptions on the program
- Next Sync Date:** Use when filling Rx to match the Rx's next refill on *gt's* next Sync date
- Old Qty Dispensed / New Qty Dispensed:** Qty Dispensed: calculate short fill and place qty of medication needed to short fill
- Old Days Supply / New Days Supply:** Use when prescription is in unbreakable box or needs to be started immediately
- Sync by Short Filling:** Use for Rx's that are used as needed and *gt* will contact the pharmacy when refills are needed
- Don't Short Fill but Keep on MedSync:** Use when *gt* will not be needing/picking up prescriptions until the next sync date

- Data collection forms or data dictionary (include even if you are submitting for publication and the journal does not require a copy of the data collection form)
- DO NOT INCLUDE THE APPENDICES IN THE PAGE COUNT.