

USC School of Pharmacy Impact of a Medication Synchronization Program for Transplant Polypharmacy Patients

Erika Generoso, Elizabeth Gonzalez, Danielle Mar & Jay Parikh, PharmD., MS
University of Southern California, School of Pharmacy

Background

Polypharmacy comes with a number of challenges, one being medication adherence. Through the use of medication synchronization, medication adherence can be improved by ensuring consistent supplies of medications and also decreasing patient and pharmacy costs by lowering the number of trips to the pharmacy and deliveries to the patients' homes^{1,2}. At USC Medical Plaza Pharmacy, there is a significant amount of transplant patients that receive a large number of chronic medications, which include anti-rejection medications that are critical to maintain a successful transplantation; therefore, mandatory adherence is necessary.

This study measures the adherence of transplant patients who were previously enrolled in a medication synchronization (MedSync) program that targeted patients with medication profiles indicative of polypharmacy. Additionally, the cost-effectiveness of this program is examined.

Methods

Retrospective, quasiexperimental research design conducted on transplant patients at the USC Medical Plaza Pharmacy from August 2019 to December 2019.

- Analyzed patients' adherence to medication and number of trips to the pharmacy and/or deliveries to patients' homes in a pilot medication synchronization program (MedSync Program) and compared it to a contemporaneous control group.
 - Eligible patients for the MedSync Program: patients who received kidney or liver transplant and received at least three chronic medications (immunosuppressants, antivirals, antihypertensives, antidiabetics, lipid lowering agents, and acid reducer)
- Criteria:**
 - Inclusion criteria:** patients previously enrolled in the MedSync Program and received immunosuppressants in addition to antivirals, antihypertensives and/or acid reducers.
 - Exclusion criteria:** patients not enrolled in the MedSync Program.
- Control patients:** patients eligible for the MedSync Program but were not enrolled. These patients received the usual care and followed the standard procedures for refills. Control patients were matched to study patients based on age, gender, type of transplantation, and drug class.
- Primary end points:**
 - Adherence - measured by proportion of days covered (PDC)

$$PDC = \frac{\text{number of days "covered"}}{\text{numbers of days in a period}}$$

- Cost savings to the pharmacy - measured via the number of trips to the pharmacy and/or deliveries to patients
- All calculations were performed using Microsoft Excel and Graphpad Prism 8
 - Continuous data analysis was done using an unpaired t-test
 - Categorical data analysis was done using Fisher's exact test

Results

Group	Age (Years±SD)	Female Gender n (%)	Transplant type	
			Kidney n (%)	Liver n (%)
Sync (n = 16)	55.31±10.64	5 (37.50%)	15 (93.75%)	1 (6.25%)
Control (n = 16)	55.56±10.48	5 (37.50%)	15 (93.75%)	1 (6.25%)

Table 1. Baseline Characteristics of Medsync and Control Group

Immunosuppressants

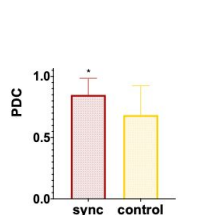


Figure 1. Comparison of Mean PDC of immunosuppressant medications in MedSync vs. Control patients

Routine Medications

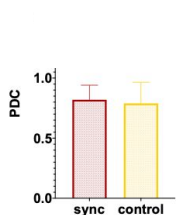


Figure 2. Comparison of Mean PDC of routine medications in MedSync vs. Control patients

Pick Up & Deliveries

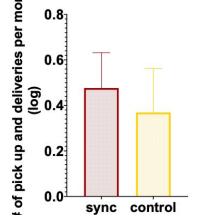


Figure 3. Comparison of Mean Number of Pick Up & Deliveries in MedSync vs. Control patients

Drug Class	Adherent (%)		OR (95% CI)	P
	Sync (n = 16)	Control (n = 16)		
Immunosuppressants	12 (37.50%)	6 (18.75%)	5.00 (1.0-18.67)	0.0732
Routine Medications	12 (37.50%)	11 (34.38%)	1.36 (0.27-5.33)	>0.9999

Table 2. Comparison of Odds Ratio of Immunosuppressants and Routine Medications in MedSync vs. Control Patients

Discussion

- Patient characteristics for age, gender, and type of transplant was similar between the MedSync and control patients (Table 1).
- PDC of immunosuppressants was 0.8488 ± 0.1359 for the MedSync patients and 0.6838 ± 0.2401 for control patients, which was statistically significant (P<0.05) (Figure 1), and the mean PDC of routine medications was 0.8194 ± 0.1216 for the MedSync patients and was 0.7894 ± 0.1760 for control patients, which was not statistically significant (Figure 2).
- The mean number of deliveries and/or trips to the pharmacy was 0.4765 ± 0.1556 for the MedSync patients and 0.3692 ± 0.1932 for the control group, which did not show significance (Figure 3).
- Additionally, patients enrolled in the MedSync program had 5 and 1.36 times greater odds of adherence, as defined as PDC ≥ 0.80, for immunosuppressants and routine medications respectively than the control group, however, both were not significant (Table 2).

Limitations

- Small sample size of 32 and the short duration of 5 months limits the power of this study and increases the margin of error.
- This study design showed an association not causality between the program and adherence. For instance, patients enrolled in the MedSync Program could differ from the control before the start of the program even after matching because they consented to enrolling and continuing in the program, which suggests that they may have been more motivated and therefore more likely to adhere to their medications even without the program.
- Adherence was examined by measuring when patients obtained their medications, which does not necessarily reflect if the medication was actually taken. Patients could have been incorrectly labeled as adherent or nonadherent.
- Inappropriate staff intervention and insufficient education on Medsync Program impacted our results.

Conclusion

- Although there was a statistically significant increase in PDC of immunosuppressants between MedSync and control patients, the odds ratio of a patient being adherent, as defined as PDC ≥ 0.80, was not significant.
- There was no significance in adherence of routine medications and number of deliveries and trips to the pharmacy.
- Overall, the study's results as well as the limitations of the study suggested that the MedSync Program was not beneficial to transplant patient adherence or cost savings to the patient or pharmacy.

References

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- Mongkhon P, Ashcroft DM, Schofield CN, et al. Hospital admissions associated with medication non-adherence: a systematic review of prospective observational studies. *BMJ Quality & Safety* 2018;27:902-914.