Impact of Automated Medication Refills on Adherence and Medication Wastage: Saudi Tertiary Hospital

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Abstract. Ambulatory care pharmacy should run with an integrated strategy for continuity of care, quality, and customer satisfaction, which is very important since it is usually the last hospital station for the patient before he or she goes home. Automatic refill programs are targeting the promotion of medication adherence; however, there is a potential concern regarding the possible wastage of medications contributed by these programs due to the reduced patient involvement in the refill medication dispensing cycle. We evaluated the impact of an automatic refill program on antiretroviral medication use. The setting of the study was a tertiary care hospital in Riyadh, Saudi Arabia (King Faisal Specialist Hospital and Research Center). The main study area is the ambulatory care pharmacy. Participants included patients on antiretroviral medications for HIV. Overall patients (91.7%) scored 0 on the Morisky scale as high adherence, 7 patients scored 1 and 9 patients scored 2 as medium adherence, and 1 patient only scored 3 as low adherence. The act goes here.

Keywords. Adherence: following medical instructions for taking medications.

1. Introduction

King Faisal Specialist Hospital and Research Center (KFSH&RC) is a tertiary/quaternary care and referral hospital. The hospital manages and treats a variety of chronic diseases. Ambulatory pharmacy services within the hospital dispense approximately 1,700,000 prescriptions per year and serve more than 500,000 patients on an annual basis [1]. Due to the nature of the diseases and the busy clinic schedules, which are usually done in 180 to 360 days, the pharmacy is dispensing medications for a duration of 90 to 180 days with refills to cover the total prescribed length [2], according to the medication availability, cost, and patient medical condition.

The large quantity dispensed results in high return and disposal rates, which reflects poor adherence especially among chronic disease patient groups, and poor therapeutic monitoring due to the possible changes in regimens. Many hemodialysis patients (HD) have other comorbidities such as diabetes mellitus (DM), coronary heart disease, heart failure (HF), etc. In general, HD patients have to take an average of 6-12 tablets per day [3]. Adherence is crucial to HD patients, which has an impact on morbidity and mortality [4].

Automated prescription medication refills have been widely adopted in recent years among US retail pharmacies [5]. Although the established automatic refill programs are

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targeting the promotion of medication adherence, there is a potential concern regarding the possible wastage of medications contributed by these programs due to the reduced patient involvement in the refill medication dispensing cycle [6].

2. Literature Review

In a randomized controlled trial evaluating the impact of medication synchronization or education program on hypertensive patients’ health outcomes. Outcomes included: systolic blood pressure (SBP), diastolic blood pressure (DBP), the proportion of patients at blood pressure (BP) goal, changes in self-reported medication adherence, and patient’s knowledge of hypertension-related topics. All groups had a significant decline in SBP from the baseline, but there was no significant difference among the study groups in the final analysis. There was no significant difference between groups in self-reported adherence [7].

Regimen complexity and prescription adherence in dialysis patients were evaluated in a multicenter study in Italy. 1238 HD patients were included. Resulted showed that the daily burden was 9.7 tablets, and 48% of patients were adherent to medication prescription. There was an association between the number of pills taken by a patient and adherence. They concluded that reducing the tablet burden might help in improving adherence [8].

In a review study, evaluating adherence to phosphate binder and outcomes in HD patients, non-adherence to phosphate binder was related to high bill burden, which resulted in higher serum phosphate levels (14). Another study of 233 patients in 3 HD centers in the US showed that a median daily pill burden of 19. Phosphate binders accounted for about one-half of it. An adherent patient was only 38 %. Adherence decreased significantly with an increasing pill count of P= 0.006 [9].

3. Research Question

The research aims to answer two main research questions, which are: “What is the impact of automated medication refills on medication adherence?”, and “Do automated medication refill programs reduce medication wastage and dispensing costs?”.

4. Methods

This prospective cohort study was conducted at a tertiary care hospital in Riyadh, Saudi Arabia (King Faisal Specialist Hospital and Research Center “KFSH&RC”). The primary study area is the ambulatory care pharmacy. The target populations of the study were patients on Antiretroviral agent therapy in KFSHRC Riyadh. To test the hypothesis that the adherence rate is 90% against the one-sided alternative that this rate is 95%, we need to recruit 289 patients and we got a total of 435 adult patients.

Patients were all offered home delivery along with the auto refill activation; deliveries were provided around the Kingdom of Saudi Arabia by the contracted couriers SMSA and SNAS. Direct pickup from the pharmacy is also an option for patients according to their preferences.
Morisky, Green, and Levine’s (MGL) adherence scale. Morisky 4-item medication adherence questionnaire includes the following four simple close-ended questions with binary response options (yes/no): Do you ever forget to take your medicine? Are you careless at times about taking your medication? When you feel better do you sometimes stop taking your medicine? Sometimes if you feel worse when you take your medicine, do you stop taking it? The score is calculated as the number of affirmative answers (range 0–4). The higher the score, the higher the risk of non-adherence; for the present analysis, patients with a score = 0 are defined as adherent.

5. Results

Patient medication profiles were analyzed while interviewing them for the Morisky adherence test; 24% of the sample group did not refill their prescriptions on time.

Using the four closed-ended Morisky adherence scale questions, we found that 187 patients (91.7%) scored 0 as high adherence, seven patients scored 1, and 9 patients scored two as medium adherence. One patient only scored three as low adherence. Figure 1 displays the results on the Morisky scale. Overall, patients on antiretroviral medications are considered highly adherent; the number of drugs per patient was found to be the only significant factor that affects their adherence. The odds ratio is approximately 2 (p-value = 0.001), meaning that every increase in prescribed drug by a count of 1, doubles the odds for forgetting to take the medication as compared to someone who has not received any increase (7% non-compliance for patients on 1 drug compared to 100% for patients on 6 or 7 drugs).

![Figure 1. Bar Chart Frequency of forgetting vs. number of drugs](image)

Upon the second automated refill, patients were re-assessed for their adherence; their Morisky scores were compared before auto-refill enrollment and after. The pre and post-analysis found a significant difference and in the mean scores; mean (pre) = 0.137 and mean(post) = 0. Using the non-parametric Wilcoxon signed-rank test to compare the median of ranked data of pre and post-produced the same p-value= 0.0002. (median of pre-scores = 0, and the median of post scores is also = 0). We identified 359 (82%) patients who received more than a 30-day supply of medication from a total of 435 patients who were initially analyzed. Table 1 represents the comparison of pre and post-implementation for the average cost per month, showing an actual reduction of 532,112 SR.
Table 1. Average monthly cost comparison pre and post

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<th>90 Day + Supply</th>
<th>30 Day Supply</th>
<th>Difference</th>
</tr>
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<tbody>
<tr>
<td>Jan to Sep</td>
<td>SAR 5,889,360.91</td>
<td>SAR 1,100,357</td>
<td>SAR 4,789,003.51</td>
</tr>
<tr>
<td>Average Monthly</td>
<td>SAR 654,373.43</td>
<td>SAR 122,261.9</td>
<td>SAR $532,111.50</td>
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All patients had a unified answer, which reflected high compliance with pharmacy rules; to return any unused medicine in case, the drug was discontinued/changed. This appeared to be very minimal for this category of patients, 9 (4%) patients only had their medications changed within the three months before their enrollment in the automated refill program.

We had two groups; patients living inside Riyadh, 97 (48%), and patients residing outside Riyadh 107 (52%). With enrollment, we offered patients two delivery methods; either they can pick up their ready fills directly from the pharmacy window or receive it as a home delivery with one of the hospital’s registered carriers (DHL Express / SMSA Express). The majority of patients (93%) in the Riyadh group requested direct Pickup and refused home delivery.

6. Conclusions

Medication adherence remains a significant public health concern, especially for complicated chronic diseases requiring lifetime medical interventions. It improves adherence and patients’ well-being and reduces the number of hospital admission, thus lowering costs. Simplifying and easing the medication refill process is one method to improve patient’s access to their medications and remove barriers to adherence.

We have demonstrated that automatic refill programs can improve adherence to the one therapeutic class of drugs. Without an increase in the frequency or magnitude of medication oversupply, this can be applied to other therapeutic classes for a larger population with other diseases.

References

[6] KFSHRC Pharmacy Achievement Report 2018