



Development of a Medication Refill System - A Collaboration Between Telemedicine and Pharmacy Departments

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Abstract

Background: The Saturday Clinic for the Uninsured (SCU) has an on-site dispensary that provides free medications to patients. Many patients request urgent refills when they run out leaving them without medications prior to their appointments. A prior study showed a reminder phone call can effectively assist with medication refills.¹ However, little data exists for how to develop such a system at a free clinic. Our team implemented this methodology utilizing a system where patients were contacted before their medications ran out to arrange refills and analyzed its effectiveness.

Methods: All clinic patients receiving medications from the on-site dispensary had their expected refill date logged. Patients 3 weeks away from needing a refill had their chart reviewed to determine if they should be contacted. When indicated, patients were contacted one time via telephone by students to assess their needs and schedule refills. System outcomes were gathered over 18 weeks and analyzed to determine the number of potential medication gaps prevented and system success rate.

Results: 131 patient charts were reviewed for potential follow-up. 58 patients were contacted, of which 32 patients were reached and spoken with resulting in 32 refills scheduled. The system prevented 24.4% of potential medication gaps with a system success rate of 55.2%.

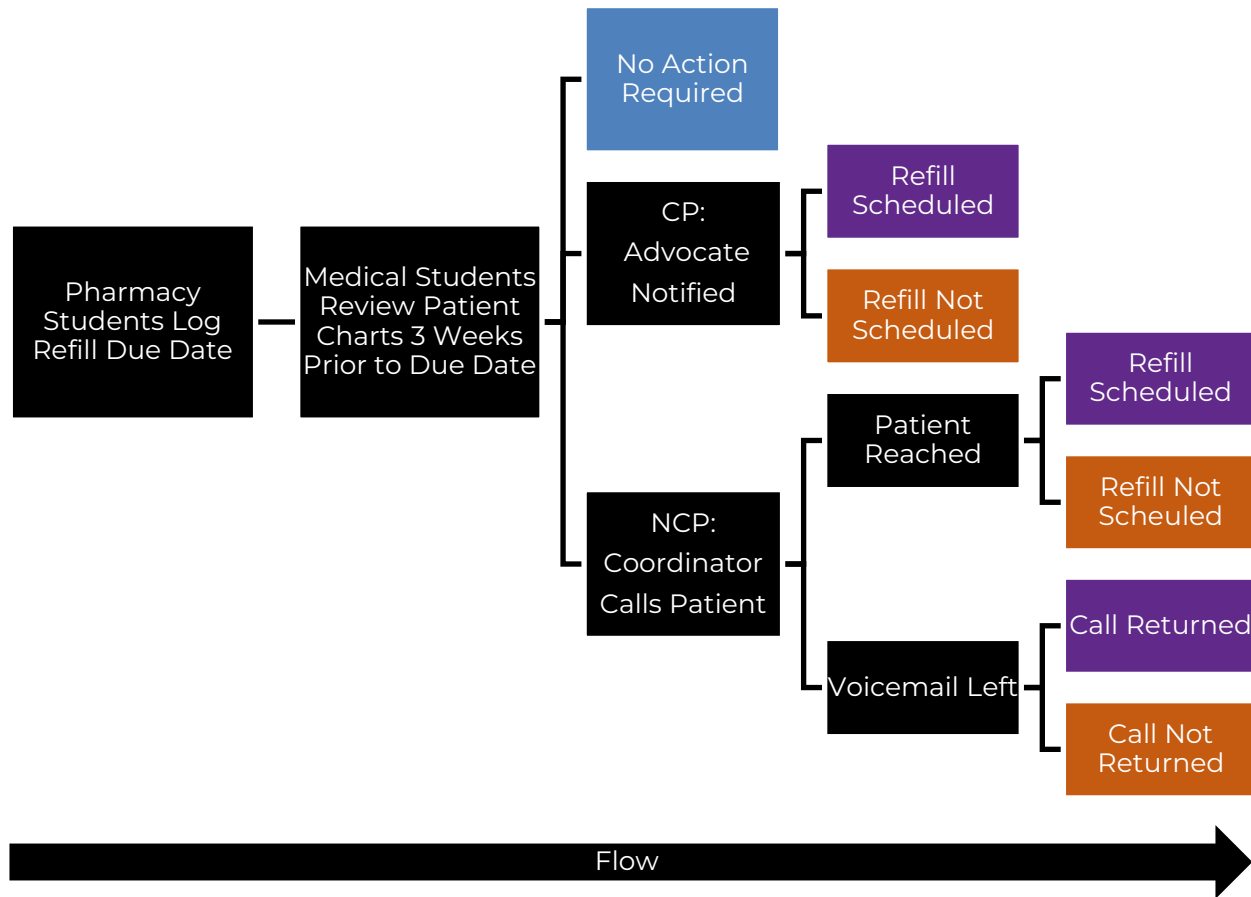
Conclusion: This system successfully reduced medication gaps among patients. The most and least effective methods for scheduling refills were by directly speaking with patients and leaving voicemails respectively. A trend observed was a decrease in urgent patient calls regarding medication gaps. Future directions include making multiple contact attempts, using multiple contact methods including texts and emails, and evaluating adherence.

Introduction

Medication adherence has been shown to contribute to decreases in both patient morbidity and mortality.^{1,2} However, patients face a multitude of barriers to medication procurement when the acute need for a refill is presented. Several factors may influence patients' abilities to obtain timely refills, including the ability to request proactive refills and appointment requirements set by providers or institutions.³

At the Medical College of Wisconsin's Saturday Clinic for the Uninsured (SCU), a student-run free clinic, patients are provided 30- or 90-day prescriptions for chronic conditions and appointments are required for additional refills per clinic guidelines. The rationale behind this guideline is to improve quality of care and patient safety by ensuring consistent monitoring and evaluation of chronic health conditions in the setting of a clinic that provides care through volunteer care teams. This often means a high turnover rate, and

Figure 1. Medication refill system workflow



The flow diagram shows the medication refill system progression from the initial documentation of the expected medication refill date through the potential resolutions for each contact method.
 CP: Continuity patient; NCP: Non-continuity patient.

thus decreased continuity for patients. Requiring an appointment for refills can be difficult for some patients to adhere to as they often are unable to schedule an appointment in advance of their medications running low.

Research has shown that physician-pharmacist collaboration models significantly improved patient chronic disease state outcomes, such as blood pressure control and HbA1c management.⁴⁻⁶ In addition, several medical organizations encourage interprofessional teams to better enhance communication and patient outcomes.⁷ At SCU, medical and pharmacy students identified patients who were at risk for gaps in medication therapy that could lead to nonadherence.

One solution to decrease gaps in medication

therapy is regular phone call reminders that prompt patients to obtain refills when they are running low. A previous randomized control trial demonstrated that within a nationwide pharmacy chain, refill reminder calls increased the number of refills within the first 14 days of the expected refill date by 22.8%.⁸ However, few data exist on how to implement such a system using proactive calls prior to refill dates or in a free clinic with limited resources.

This project aimed to demonstrate that adherence interventions like the aforementioned refill reminders can be effectively implemented at a free clinic to reduce medication gaps. To achieve this, team members developed a patient contact system utilizing reminders to prompt patients about medication refills prior to their expected

refill date.

Methods

An interprofessional project team was created that involved medical students, pharmacy students, physicians, and pharmacists. As shown in Figure 1, when medications were filled at SCU's dispensary, the date was recorded in an online database and a date approximately 3-weeks prior to the expected need for a refill was calculated, presuming 100% adherence. This date was termed the 'calculated refill due date.' A timeframe of three weeks was selected to allow for schedule flexibility and to provide patients with adequate time to schedule an appointment before they experienced a gap in medication therapy.

Over 18 weeks, between October 2021 and February 2022, interprofessional student volunteers accessed the recorded fill data weekly to identify patients with medications past the calculated refill due date. Patients who had their prescriptions filled outside of the clinic dispensary were excluded. Student volunteers then completed chart reviews for the identified patients to assess the necessity to schedule a refill appointment. No action was taken by the project team if chart reviews revealed a patient 1) was already scheduled, 2) had discontinued a medication or received a more recent refill, or 3) was no longer eligible to be seen at the clinic.

Patients fit into two categories: non-continuity patients (NCP), who adhered to the standard of care within the clinic, and continuity patients (CP), who were assigned a volunteer medical student that served as an advocate for long-term management of chronic conditions. To schedule refills for NCPs, project team members called patients, and if the call was answered, patients were asked how much medication they had remaining, and an appointment was scheduled if needed. If the call was not answered, a voicemail was left. This voicemail contained a generic greeting, indicated the caller was from the clinic, and requested they call back at the indicated phone number. Patient information including their name or the reason for the call was not included in the voicemail so as to protect patient health information and privacy. Documentation

was completed in a secure clinic spreadsheet and included patient name and the resolution of the call. When voicemail was available, students performed an additional chart review the following week to assess whether contact was made with the patient in the interim and if an appointment was scheduled. To schedule refills for CPs, project team members emailed the CP's assigned student advocate advising them to contact the patient. Advocates then contacted the patient and relayed appointment information back to the team.

Outcomes were sorted into three major categories based on the result: (1) No Action Needed, (2) Refill Scheduled, and (3) Refill Not Scheduled. To assess the effectiveness of the system, variables were calculated from the outcomes including System Redundancy, Potential Medication Gaps Prevented, and System Success Rate. System Redundancy represented situations that used clinic resources for chart review unnecessarily and was calculated as follows:

$$\text{System redundancy} = \frac{\text{No action needed}}{\text{Patients reviewed}}$$

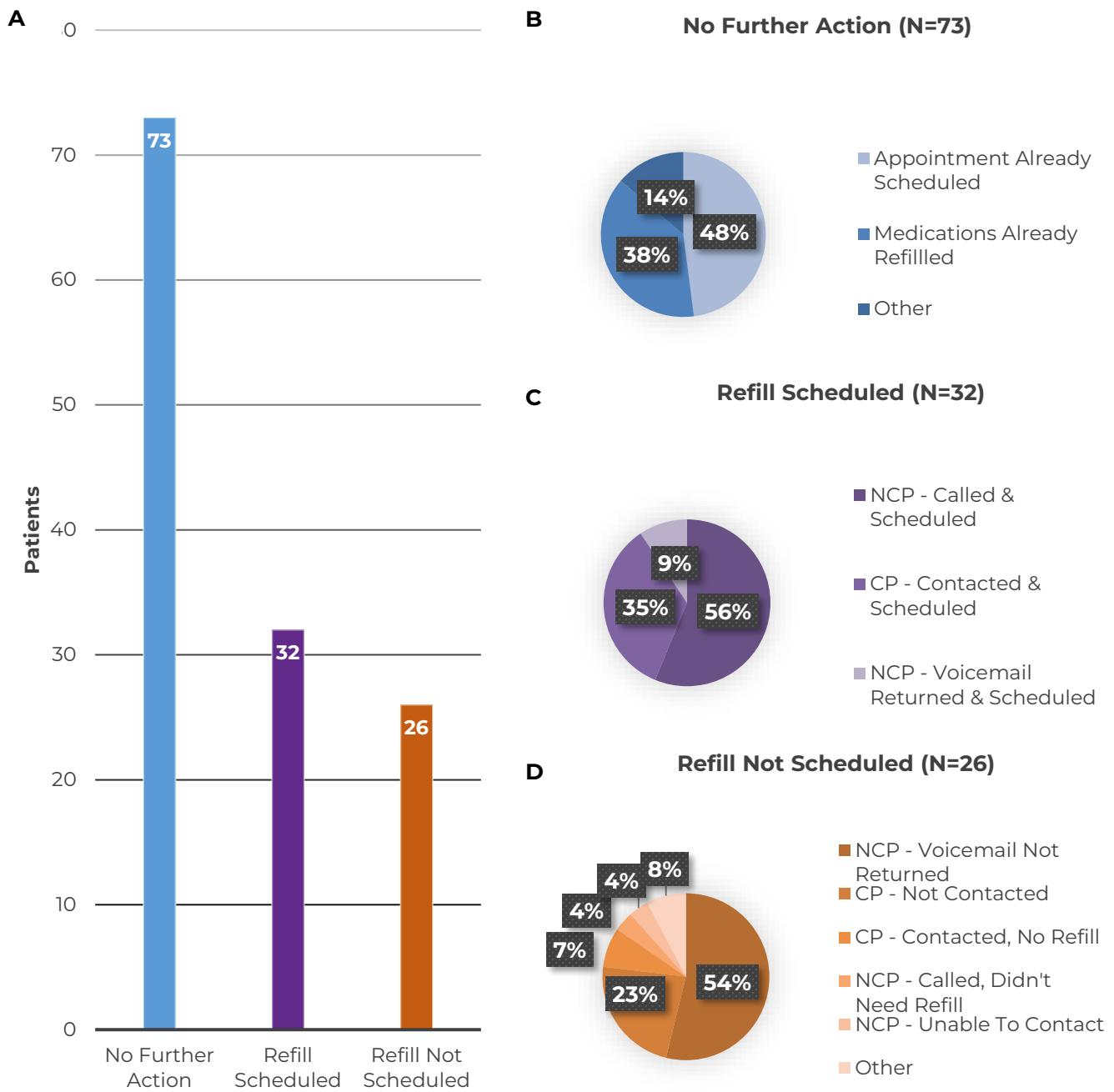
Patients who had their medication refill appointments successfully scheduled because of the system fell into the category Refill Scheduled, and the details leading to this result were tabulated. These patients included NCPs and CPs who successfully scheduled appointments after being contacted. These scenarios represented instances that would have likely resulted in a medication gap. Thus, the Potential Medication Gaps Prevented percentage was calculated as follows:

$$\text{Potential medication gaps prevented} = \frac{\text{Refills scheduled}}{\text{Patients reviewed}}$$

The System Success Rate, where Actions Taken represents calling patients, leaving voicemails, or contacting student advocates, was calculated to measure the effectiveness of contacting patients to schedule refills as follows:

$$\text{System success rate} = \frac{\text{Refills scheduled}}{\text{Actions taken}}$$

Figure 2. Prescription call back system outcomes



The chart shows the outcomes of the prescription call back system. The bar graph demonstrates the 3 main outcomes of the chart review performed by medical students. The 3 pie graphs illustrate the corresponding subcategory percentages of reasons leading to each of the 3 main outcomes.

CP: Continuity patient; NCP: Non-continuity patient.

Statistics

Outcome data from the medication refill reminder system was analyzed using Microsoft Excel (16.9, Microsoft, Redmond, Washington). Two chi-square tests of independence were

performed to examine relationships in the data with a p-value of 0.05 as the threshold for statistical significance. The first chi-square test of independence was performed to examine the relationship between contact modalities. The null

hypothesis was that there was no relationship between the contact modality and successfully scheduling a refill. The alternative hypothesis was that there was a relationship between the two variables. Direct contact modality was achieved via phone calls that were completed by talking directly to a patient. Indirect contact modality was achieved when the student volunteers left a voicemail. The second chi-square test of independence was performed to examine the relationship between type of patient (CP versus NCP) and effectiveness in contacting by direct modality. The null hypothesis was that there was no relationship between the type of patient and successfully scheduling a refill and the alternative hypothesis was that there was a relationship between the two variables.

Results

A total of 131 patients seen at SCU were reviewed and included in this study. System outcomes are shown in Figure 2. The System Success Rate was calculated to be 55.2%, with this metric increasing to 85.7% when analyzing only patients with whom contact was established. The system prevented 24.4% of potential medication gaps across all patients who were reviewed, and the System Redundancy was found to be 55.7%. There were 10 patients who did not require further action due to discontinuation of medication therapy or who were no longer utilizing clinic services (Listed as “Other” in Figure 2B.). There were 2 patients who required action but did not receive a refill as they were called and found to be no longer using clinic services (Listed as “Other” in Figure 2D.).

The results of the chi-square analysis of direct versus indirect contact modalities is shown in Figure 3, and was significant, $X^2(1, N = 38) = 17.606$, $p < 0.01$. In addition, the chi-square analysis of CP versus NCP contact using direct modality is shown in Figure 4, but was not significant, $X^2(1, N = 34) = 0.0077$, $p = 0.9$.

Discussion

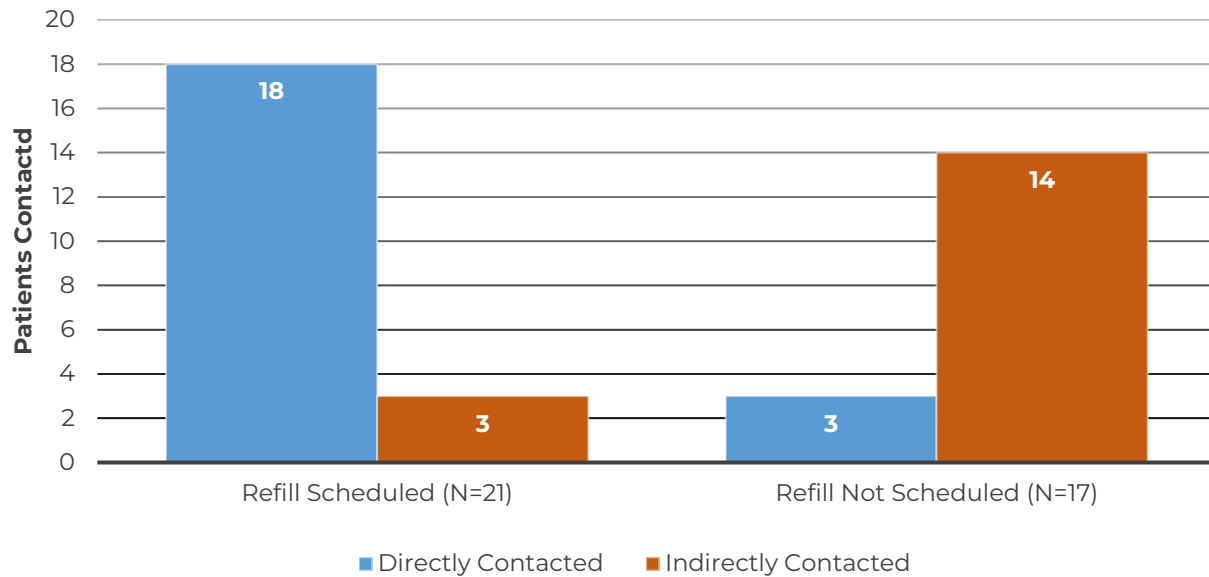
Patients receiving care at SCU were at an increased risk for medication nonadherence when they were not scheduled for a clinic visit in

advance. Of the 131 patients included, 58 patients did not proactively schedule appointments and required reminders to ensure refills were obtained. Direct contact with patients resulted in a significant difference in appointments scheduled when compared with leaving voicemail messages. It was postulated that a conversation was more effective due in part to a lack of health literacy in our patient population. While health literacy was not an aim of our research, previous studies have shown that health literacy was positively correlated with medication adherence.⁹ Direct contact also allowed the patient the opportunity to schedule an appointment directly and eliminated the barrier of them having to take another action and call the clinic back to schedule an appointment in response to the voicemail reminder.

Project team members report anecdotal evidence that patients frequently asked why an appointment was needed, and members explained the reasoning using prior clinical documentation, such as a medication dosage requiring lab monitoring.⁹ Notably, it was observed that many of the patients contacted were appreciative of the reminders. It also allowed an additional opportunity for patients to ask questions related to their healthcare. While health literacy was not directly assessed, it is additionally notable that the clinic exclusively serves uninsured patients who may have a lower level of health literacy given other co-morbid social determinants of health.¹⁰

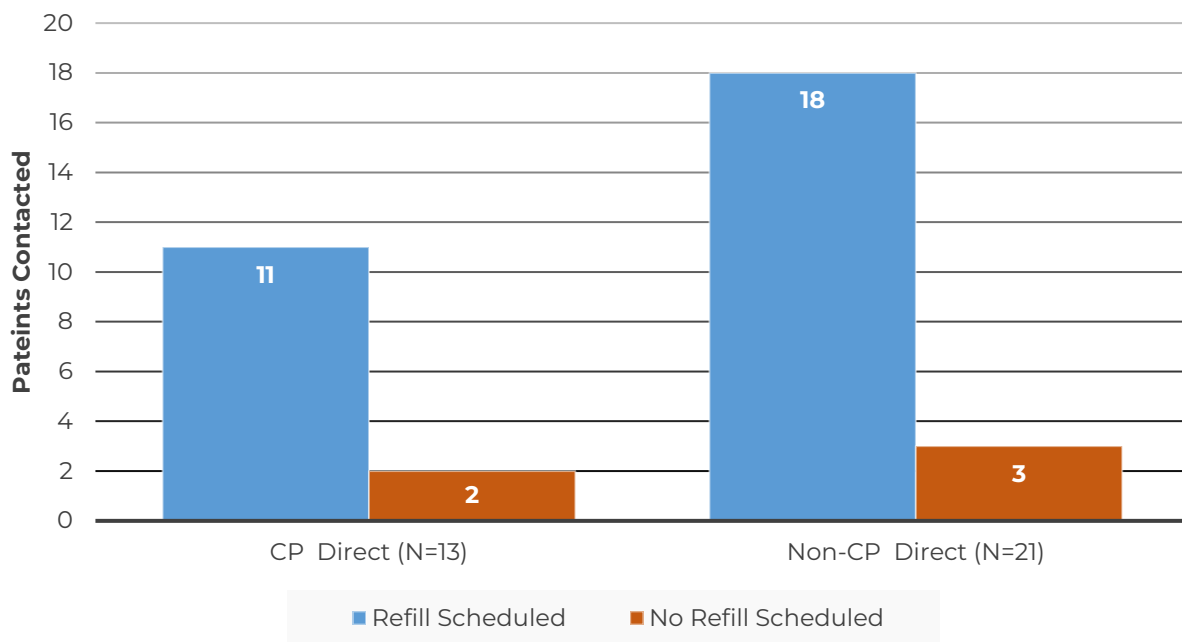
The results of this study showed that the direct contact modality was more likely to result in successfully scheduling an appointment with an NCP than the indirect contact modality. It also showed that the proportion of patients successfully contacted by direct modality did not differ based on whether a project team member or the patient's student advocate attempted contact. The first chi-square test, which examined the relationship between contact modalities, was found to be statistically significant. This indicated there was a relationship between contact modality and successfully scheduling a refill. However, the second chi-square test, examining the relationship between patient type and direct contact modality effectiveness, was not statistically significant. Thus, indicating there was no relationship between patient type and successfully

Figure 3. Direct versus indirect contact method comparison for scheduling NCP refills



The graph shows the number of NCPs who had refill appointments scheduled as examined by contact modality. Directly contacted NCPs were spoken with over the phone, indirectly contacted NCPs had a voicemail left and had their chart re-evaluated 5 days later to see if they had called the clinic back. NCP: Non-continuity patient.

Figure 4. CP versus NCP comparison when using direct contact method for scheduling refills



The graph shows the number of patients who had refill appointments scheduled using the direct contact modality as examined by patient type of CP versus NCP. CP: Continuity patient; NCP: Non-continuity patient.

scheduling a refill. This supports the notion that resolved phone calls were more effective than voicemails for successfully scheduling patients for refills and did not show significant differences based on whether a team member or student advocate was contacting them.

There were several limitations to our study. Since the intervention served to prevent medication gaps proactively, it cannot be certain all patients would have experienced gaps in medication therapy if it were not implemented. However, at SCU, the clinic appointment schedule is often full weeks in advance and it is probable the intervention reduced emergency refills and delays associated with filling medications outside of the standard clinic operational procedure. Secondly, only one attempt to contact each patient per week was made, and a single voicemail was left if a patient could not be reached. This limitation was due to a shortage of volunteers to make multiple contact attempts during the first iteration of the system. Reasons for failed contact attempts were not assessed but may have been due to patients' availability to answer or failing to review voicemails. Patients might not have responded to voicemails because the limited information they contained failed to convey the message's importance. Other reasons for non-response could be due to patient contact preferences. In addition, this study focused on a single free clinic located in an urban area and thus its findings may not be generalizable. Clinics located in suburban or rural areas may see differences in their results stemming from differences in patient demographics or logistical constraints that were not analyzed in this study. This study also focused on a clinic that had a dispensary located on-site which allowed for documentation and tracking of data related to patient refills and appointments. Clinics without on-site dispensaries may struggle to implement such a study due to constraints with recording data between the clinics and dispensaries. Finally, our study included a small sample size of uninsured adults, mostly between the ages of 18-65 years old, which further limits the generalizability of our findings. This study showed implementation could be utilized to benefit other student-run free clinics, including those with different policies regarding refills. Implementation required few resources and few

volunteer hours per week outside of the initial time to plan and implement the project. Once fully operational, team members averaged less than three hours each week performing process related tasks. This intervention also provided an interprofessional educational opportunity for medical and pharmacy students to interact early in their respective educations to build rapport and establish an understanding of each other's disciplines. With the implementation of the medication refill system, the number of patients who were at risk for medication therapy gaps due to not scheduling appointments was significantly reduced.

Conclusion

This study found that reminder calls were an effective method to successfully prevent medication gaps due to scheduling, albeit with some observed redundancy and inefficiency illustrated by the 55% of patients reviewed who did not require reminder calls. As phone calls may not be equally effective for all patients, the next iteration of this system will involve implementing a text-message refill reminder when patients are initially unable to be reached by phone. Future changes that could improve the system's success rate include using alternative digital methods of communication, such as automated chart notifications. In addition, future studies should consider recording information on other variables that could potentially impact patient adherence. This may include patient demographics as well as logistical data such as patient distance to the clinic and their primary method of transportation. In addition, baseline data from existing refill systems should be obtained in future studies so that comparisons can be made between them and systems implementing reminder phone calls. Though limitations existed with this study, the data showed that implementing an interprofessional medication refill reminder system was feasible within SCU and could likely be implemented in free clinics across the country to improve medication adherence. These findings support the notion that free clinics without existing refill reminders would likely benefit from implementing a similar system at their facilities.

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Disclosures

The authors have no conflicts of interest to disclose.

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