

# Improving Timely Medication Access for Endocrinology and Diabetes Patients: A Quality Improvement Initiative

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## ABSTRACT

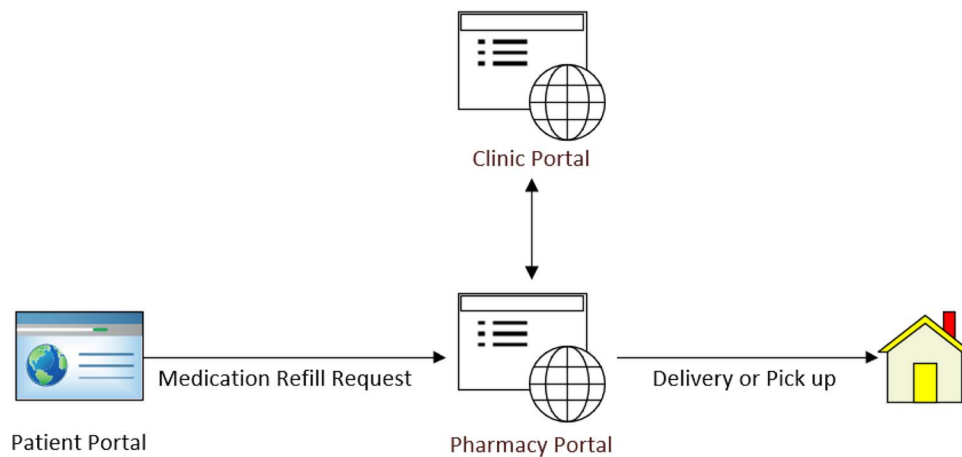
**Introduction:** Managing chronic conditions such as endocrinology and diabetes requires consistent access to medications. Traditional methods of medication refill often involve in-person visits to healthcare providers or pharmacies, posing challenges for patients. Online medication refill services offer a promising solution to improve accessibility and convenience. **Methods:** This is a digital-based solution using online medication refill services to enhance the management of endocrinology and diabetes medication refills. It examines the process of online medication refill, including patient registration, refill request submission, verification, provider input, processing, and pickup or delivery. **Results:** Online medication refill services empower patients to easily request refills from the comfort of their homes, streamlining the refill process, and reducing walk-in pressure in clinics. The online medication refill with the option for home delivery option eliminates the need for patients to visit the hospital, further enhancing the patient experience. Before implementing the online medication refill solution, 26 patients will come to the clinic as walk-ins to request medication refills. The average waiting time for each patient is 45 minutes. Each provider will be interrupted for an average of 10 minutes to accommodate the request. The overall processing time required for each walk-in patient to submit the medication request is 1 hour on average. After implementing the online medication refill intervention, zero patients come to the clinic as walk-ins and hence, no interruption to the daily regular clinics. The overall processing time required for submitting the online medication request is now 2 minutes. These interventions promote medication adherence and patient engagement by facilitating access to medications and offering educational resources. **Conclusion:** Online medication refill services represent a valuable tool in the comprehensive management of endocrinology and diabetes. They offer accessibility, convenience, and patient empowerment, potentially improving health outcomes and enhancing the overall patient experience.

**Keywords:** healthcare, medication refill, endocrinology and diabetes, quality improvement

## INTRODUCTION

The medication refill in ambulatory care settings requires time-consuming steps such as scheduling an appointment with a physician. In some cases, access to an appointment might take a long time because of the long waiting list. Hence, most patients opt for a walk-in appointment, which causes interruption to the clinics. This process can be

challenging for both patients and physicians. We have introduced an online patient portal for pediatric endocrinology and diabetes patients to be able to request medication refills online and have the medications delivered to the patients' homes to reduce the load on both patients and physicians.<sup>[1]</sup> Online communication between patients and healthcare providers has enhanced the management of chronic diseases in outpatient settings.<sup>[2,3]</sup>



**Figure 1.** Three-way communication among patient, pharmacy, and clinic.

In recent years, the emergence of online medication refill services has revolutionized the way patients access their medications, offering a convenient alternative to traditional refill methods. These online platforms and mobile applications enable patients to request medication refills from the comfort of their homes, eliminating the need for physical visits to healthcare facilities or pharmacies. For patients managing endocrinology and diabetes, online medication refill services hold particular promise in improving accessibility, streamlining the refill process, and enhancing the overall patient experience.

In the management of endocrine and diabetes disorders, outpatient medication adherence stands as a cornerstone for achieving optimal health outcomes. Diabetes, a chronic endocrine condition characterized by aberrant blood glucose levels, demands consistent medication adherence to mitigate complications and maintain overall well-being.<sup>[4]</sup> However, the intricate nature of diabetes management, compounded by the lifelong necessity for pharmacological intervention, renders outpatient medication refill adherence among endocrine and diabetes patients a matter of paramount importance.<sup>[5]</sup>

The challenges inherent in sustaining medication adherence among this patient population are multifaceted and demand nuanced exploration. Endocrine and diabetes patients often face a plethora of barriers that impede their ability to consistently come to the clinic to meet the physician to refill prescribed medications. These barriers encompass individual patient characteristics, healthcare provider practices, and systemic factors, each of which warrants meticulous examination to devise effective intervention strategies.<sup>[6]</sup> With the long waiting list, patients encounter challenges to schedule an appointment in a timely manner to refill their medication before running out of medications. Prescribing patterns, patient education initiatives, communication strategies, and follow-up mechanisms all contribute to patients' adherence to medication refill schedules.<sup>[7]</sup> Hence, most patients come to the clinics as walk-ins interrupting the clinic flow.

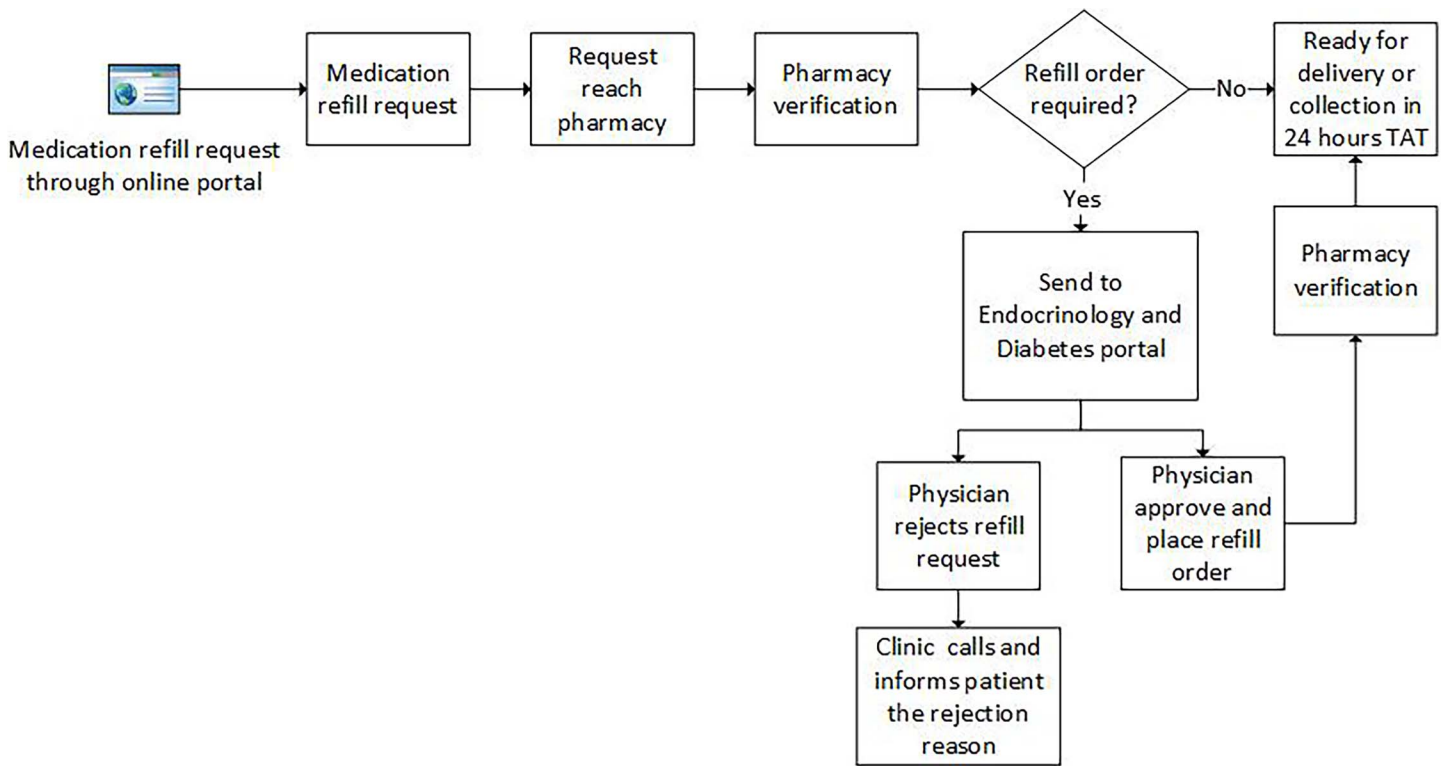
A study found that patients using an online refill platform were more likely to adhere to their medication regimen compared with those using traditional refill methods.<sup>[8]</sup> Similarly, a study reported higher medication adherence rates among diabetes patients using an online pharmacy compared with those using brick-and-mortar pharmacies.<sup>[9]</sup> Patient satisfaction with online medication refill services has also been a focus of research. A survey conducted by Alshahrani<sup>[10]</sup> revealed high levels of satisfaction among endocrinology patients using an online refill platform, citing convenience and ease of use as primary reasons for satisfaction. Furthermore, studies have highlighted the potential of online refill services to improve access to medications, particularly for patients in rural or underserved areas.<sup>[11]</sup> Systemic factors, including pharmacy and physician follow-up appointment accessibility, often hinder patients' ability to refill medications on time, thus compromising treatment efficacy and patient outcomes.<sup>[12–14]</sup>

In this quality improvement initiative, we introduce an online medication refill portal with the aim of eliminating the need for the patients to visit the clinics physically for medication refills to enhance patient experience and reduce the pressure of the walk-in appointments in the clinics.<sup>[15–17]</sup>

## METHODS

This quality improvement project was exempt from ethical approval and informed consent was not required. Standards for Quality Improvement Reporting Excellence for Education (SQUIRE) 2.0 guidelines were used to report this quality improvement project.<sup>[18]</sup>

An online tool and an improvement process were developed and implemented to allow patients to submit medication refill requests online and enhance communication between the patients and the healthcare providers to fulfill the medication refill needs (Fig. 1). This study was carried out for a period of 7 months at an outpatient department in a tertiary hospital in Qatar.



TAT: Turn Around Time

**Figure 2.** Flow chart of the online medication refill process post-intervention.

The online medication refill tool is an integrated tool that allows patients to fill out a short form to request the refill of the required medication. During their initial clinic visits, patients have been educated by the nurses with all the necessary information about the new medication refill tool and pamphlets have been distributed to the physicians outlining a step-by-step guideline on how to use the medication refill tool.

Once the request is submitted online, the request goes to the pharmacy for verification. The integrated tool pulls the patients' medical details into the pharmacy portal allowing the pharmacist to verify the eligibility and required medication. If there is a valid refill order in the system, the pharmacist will process the request and the medication will be ready for pick up or delivery within 24 hours. If a medication refill order or a physician's input is required, the request will be sent electronically to the endocrinology and diabetes clinic for the physician's processing. A group of physicians reviews and processes the requests on a daily basis. If the physician in charge approves the request and the required order is placed, the request will be moved back to the pharmacy team for processing. If the request is denied by the physician in charge, the endocrinology and diabetes clinic will contact the patients by phone informing them about the denial reason and the next step (Fig. 2).

More details on the approach used to develop and implement the online refill system are described below using the plan-do-study-act (PDSA) cycle methodology.

### PDSA 1: Planning and Preparation

- A multidisciplinary team consisting of an endocrinologist, nurses, pharmacists, software developers, and patient experience has been formed to guide the implementation process.
- Needs assessments have been conducted to identify key features and functionalities required in the online medication refill system, considering patient preferences, healthcare providers' workflows, and regulatory requirements.

### PDSA 2: The Online Platform Development

- Collaboration done with software developers to design and build the refill platform, ensuring it meets the specific needs of endocrinology and diabetes patients.
- The platform was customized to include features such as medication refill requests, feedback communication between the pharmacy and clinic providers, educational resources, secure messaging with healthcare providers, and integration with electronic health records (EHRs).

**Table 1.** Effect of online medication refills during the study period (Nov 1, 2023, to Mar 31, 2024)

Variable	n
Online medication refill requests	2261
Online medication requests processed without the need of physicians' input	935
Online medication requests required physician's input	1326
Online medication requests denied by physicians	7

### PDSA 3: Pilot Testing

- A pilot test of the Refill platform was conducted with a small group of users to evaluate usability, functionality, and user satisfaction.
- Feedback was gathered from pilot participants to identify any usability issues, bugs, or areas for improvement in the platform.

### PDSA 4: Training

- Training sessions were provided for the end users on how to use the system platform effectively.
- Pamphlets were created and distributed to the patients with step-by-step details on how to use the system.

### PDSA 5: Evaluating and Monitoring

- The impact of the refill platform has been evaluated based on adherence, patient satisfaction, system utilization, and health outcomes through regular monitoring and data analysis.

## RESULTS

On average, 26 patients used to visit the endocrinology and diabetes outpatient clinic daily as walk-ins to request medication refills, which resulted in interrupting the clinic's flow and patients had to wait in the waiting area for about 1 hour to have their medication refill request submitted. Since November 1, 2023, after implementing the online medication refill, all patients have been using

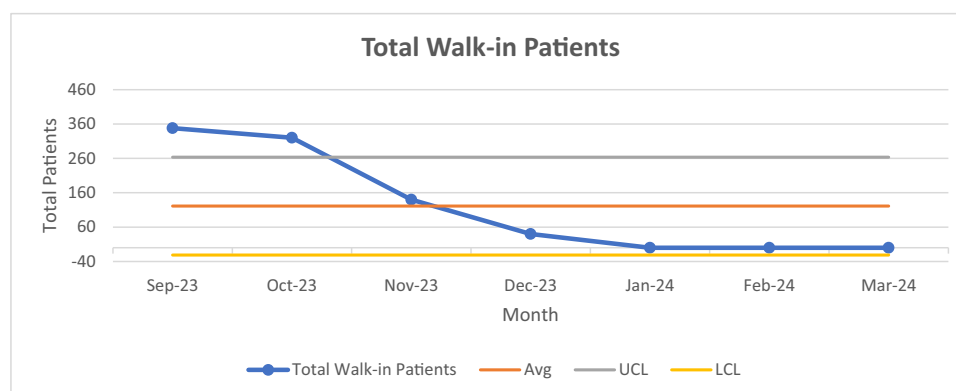
the online medication refill tool resulting in zero walk-in patients visiting the clinic for medication refills.

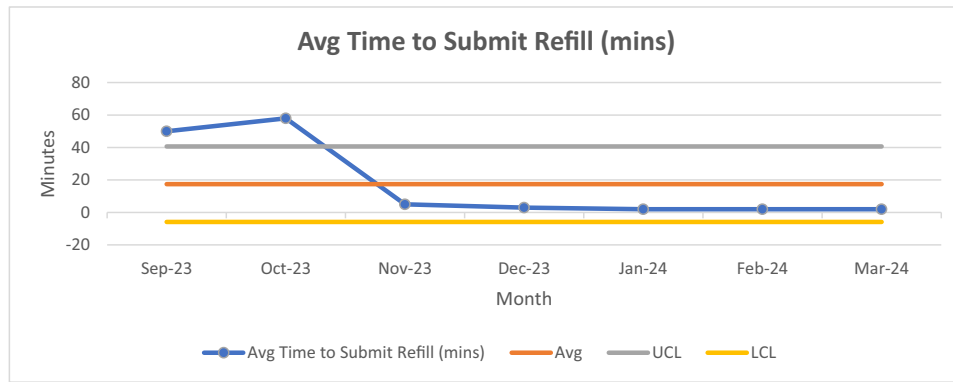
To study the success of the intervention, the nurse's team monitored the flow of patients and captured if any patients visited the clinic physically as walk-ins for medication refill purposes. We have also generated reports from the system to generate the stats of the online medication transactions.

A total of 2261 patients have requested medication refills using the online tool of which 935 requests have been processed without the need for physicians' inputs. A total of 1326 requests required physicians' inputs, which have been processed electronically. Seven requests have been denied and returned by the physicians for further investigation. Table 1 and Figures 3 to 5 show the outcome measures before and after the online medication refill intervention implementation.

## DISCUSSION

Overall, the project findings underscore the nature of medication refill tool utilization among endocrine and diabetes patients. Individual patient experience, healthcare provider practices, and technology availability collectively shape the success of adopting the online medication refill tool. Interventions targeting health literacy, patient-provider communication, patient satisfaction, and pharmacy accessibility may hold promise in enhancing medication refill adoption and improving health outcomes in the selected population. Implementing the online medication refill intervention has benefits for both patients and clinics. From the patient's perspective, patients now have the opportunity to order medication refills from home with the option of home delivery. This has created an advantage for the patients to be more adherent to the medication refill compliance. From the clinic's perspective, 452 online medication refill requests have been submitted monthly with no physical interaction with the clinic. This has eliminated the clinic interruption of 10 minutes per patient causing delays to the regular clinic flow.

**Figure 3.** Average daily walk-in patients before and after the intervention. Avg: Average; LCL: Lower Control Limit; UCL: Upper Control Limit.



**Figure 4.** Average time to submit the refill in minutes before and after the intervention. Avg: Average; LCL: Lower Control Limit; UCL: Upper Control Limit.

A retrospective study was conducted by Thorakkattil et al<sup>[1]</sup> in an ambulatory care setting of Johns Hopkins Aramco Healthcare where the utilization pattern of MyChart for medication renewal and refill pickup services for ambulatory care patients of all specialties was analyzed for 2 years. They reported 156,020 medication refills were requested through MyChart with no direct pharmacy visits. Our study and conclusion align with the study conducted at Johns Hopkins Aramco Healthcare and in agreement with the fact that offering electronic medication refill system removes the barriers of the patients including traveling to the clinic and pharmacy and long waiting times especially in busy pharmacy and hospitals.

## Project Limitations and Challenges

### Technological barriers

Not all patients may have access to or be comfortable using digital platforms to request medication refills. Older adults, individuals with limited internet literacy, or those without access to smartphones or computers may face challenges in utilizing the online refill system.

### Patient education

Successful adoption of the online refill system relies on patients' understanding of how to use the technology effectively. Lack of adequate patient education and support may lead to low utilization rates and hinder the system's impact on medication adherence and patient outcomes.

### System downtime and technical glitches

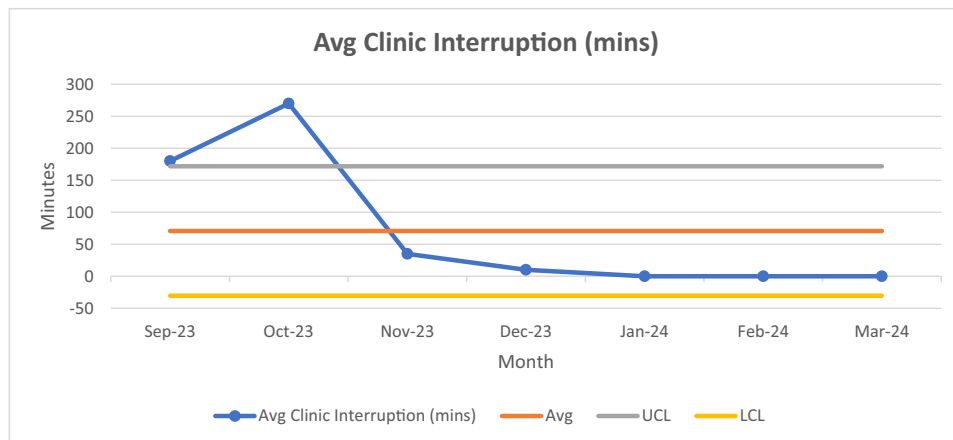
Like any digital platform, the online refill system may experience downtime or technical glitches, such as server outages or software bugs. Such disruptions could lead to delays in medication refills and negatively impact patient satisfaction and adherence.

### Dependency on patient engagement

The effectiveness of the online refill system relies heavily on patient engagement and proactive use of the platform. If patients fail to utilize the system regularly or forget to request refills on time, the intended benefits of improved efficiency and medication adherence may not be fully realized.

### Future Directions

Once the efficacy of our online medication refill system has been established, our focus will shift toward



**Figure 5.** Average clinic interruption in minutes before and after the intervention. Avg: Average; LCL: Lower Control Limit; UCL: Upper Control Limit.



expanding and broadening its application to include diabetes consumables requests, aiming to maximize its advantages across the hospital. Presently, patients often need refills for essential diabetes consumables such as needle pens, test strips, transmitters, and glucose monitoring sensors. Typically, patients are required to obtain refill requests directly from providers to access these supplies from the hospital's supply store. Our strategy involves implementing an online system tailored to handle these consumables requests, mirroring the structure and functionality of our successful medication refill system.

## CONCLUSION

The implementation of an online medication refill system in an endocrinology and diabetes clinic offers significant benefits for both patients and healthcare providers. Through the course of this research paper, we have explored the rationale, process, and outcomes associated with adopting such a system. The findings of this research suggest that transitioning from traditional refill methods to an online platform enhances efficiency, improves patient satisfaction, and optimizes clinic resources. Patients benefit from the convenience of requesting refills anytime, anywhere, leading to better medication adherence and overall health outcomes. Moreover, the streamlined refill process reduces the administrative burden on clinic staff, allowing them to allocate time and resources more effectively toward patient care and other essential tasks.

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