

# **A Patient Safety Program & Research Evaluation of U.S. Navy Pharmacy Refill Clinics**

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## **Abstract**

Historically, pharmacists have been safety consultants for patients with minor illnesses and have assisted in important decisions regarding medication refills. Time constraints are considerable for all medical personnel and using the pharmacist's medication knowledge in clinical practices produces greater efficiency in crowded clinics, while addressing potential adverse events and medication contra-indications. A pilot project was designed for pharmacy refill clinics in the summer of 1999 at the Bremerton Naval Hospital and the Everett Naval Clinic, in Washington. The Pharmacy Refill Clinic Pilot Study led to development of a "standard package" refill authorization program to better serve patients. The pilot project identified patient safety issues, cost savings, provider time saved, documentation issues, and the increased benefits to the patients. Using the pilot project as a model, the pharmacy refill clinic at the U.S. Naval Hospital at Keflavik, Iceland, was established in January 2001. The Keflavik Pharmacy Refill Clinic was designed to maximize patient safety when chronic medications were renewed, through the use of 89 drug protocols intended to provide safe continuity of prescribing for stable patients. Patients are asked consistent questions by a pharmacist that address the safe consumption of medications and determine whether they are experiencing adverse reactions or suboptimal disease therapy. In order to avoid harmful or persistent side effects, it is imperative that patient safety be explored thoroughly as medications are renewed. The pharmacist reviews the patient's medical record, laboratory values, prescription refill history, and talks to the patients to uncover issues that may compromise their safety. The Pharmacy Refill Clinic identifies patients that were not properly dosed and had high or low laboratory values; this is paramount for patient care as, for example, long-term high cholesterol and hypertension can lead to stroke and heart attack. Using a pharmacist to dispense renewal medications resulted in an overall cost savings, while reducing physician workload. This approach also opened up more appointments for acutely ill patients, further expediting the identification and treatment of their clinical conditions.

## **Introduction**

Historically, pharmacists have been consultants for patients with minor illnesses and have assisted in important decisions regarding medication refills.<sup>1</sup> The roles of pharmacists today have expanded into many different areas. Making

use of the pharmacist's "medication knowledge" in clinical practice helps to prevent overcrowding, while advancing efficiency, in the clinics.<sup>2-5</sup> Providers who work for health maintenance organizations generally are allotted less time per patient appointment, and each type of provider appointment is allotted a predetermined number of minutes. Each appointment in the civilian sector lasts about 10 minutes, while in military installations the norm is about 15 minutes. Concerns have been raised regarding the quality of patient care as a result of shrinking provider time. In an effort to compensate for the reduced provider time, pharmacists, who are drug experts, can play a valuable role in optimizing medication use.<sup>6</sup>

One of the first pharmacy-monitoring programs served the Northeastern Navajo Indian Reservation in 1972.<sup>7</sup> The Shiprock Indian Hospital collected data for seven months on approximately 477 patients. The aim of this early program was improved monitoring of drug therapy, and patients with stable, drug-controlled medical problems were referred by their physicians to the pharmacists. The program demonstrated that a pharmacist is capable of monitoring drug therapy. There has been an increase in pharmacy refill clinics in the last 25 years.<sup>8-9</sup> Gardner,<sup>10</sup> Jones,<sup>11</sup> and McKenney<sup>12</sup> each described pharmacy refill clinics. These clinics assist patients who have chronic diseases and are stable while using their medications. This process improves access to timely drug renewals and minimizes adverse effects.

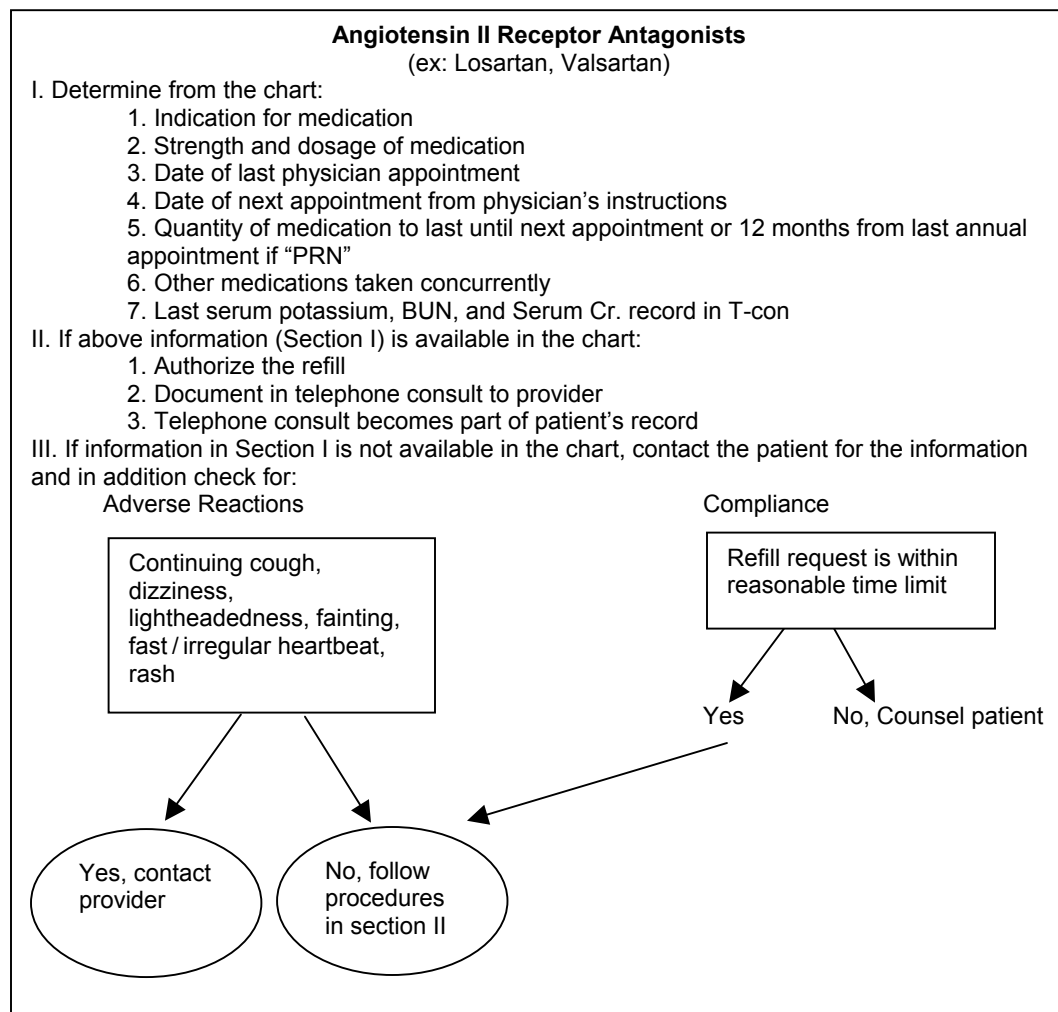
Pharmacy technicians are a valuable necessity to the pharmacy practice, and are expected to process many aspects of the daily workload. Technicians are capable of checking prescriptions as well as pharmacists. The mean +/- S.E. daily rates of dispensing-error identification by pharmacists (0.0125+/- 0.0069) and technicians (0.0119+/-0.0001) did not differ significantly in a study by Ness.<sup>13</sup> Pharmacy automation with new bar code technology is involved in both large and small practices to guarantee that the patients get the correct medication; it is a good time to expand the capacities of technicians. It makes economic sense for less expensive technicians to check prescriptions, if they can do so with the same accuracy as pharmacists. This reallocation of labor would allow pharmacists to redirect their time toward pharmaceutical care and other cognitive skills.

The purpose of this paper is to evaluate the success of pharmacy refill clinics that were put in place at select naval installations. A primary goal of the pharmacy refill clinic is to improve patient safety through accurate medication and doses, maintenance of normal lab values, and minimizing adverse drug effects. This study of the refill clinics is designed to discover if a pharmacist's knowledge supports the provider's time constraints to more efficiently serve their patients in dealing with medications, compliance, and adverse effects.

In the Washington State pilot study that took place Aug. 18–Sept. 13, 1999, the pharmacist at the pharmacy refill clinic provided services to family practice patients. In the study at the United States Naval Hospital (USNH) in Keflavik, Iceland, data collection from the pharmacy refill clinic occurred from January 2001 to September 2002. A "standard package" refill authorization program was developed for the pilot study to better serve patients with medical problems. The

program has 89 drug class protocols to ensure patient safety and continuity of care. An example of a protocol is provided in Figure 1.

**Figure 1. Angiotensin II receptor antagonist flow diagram—example of a drug protocol**



These protocols allowed the providers the confidence of knowing how a pharmacist would react in a given situation. The drug categories included in this program are: allergy, anti-inflammatory, autoimmune, cardiovascular, dermatologic, gastroenterologic, gynecologic, immunosuppressive, metabolic, neurologic, ophthalmologic, psychiatric, pulmonary, urologic/rehabilitation, and virology. The pilot study identified: patient safety issues, cost analysis (dollars savings based on pay per hour), provider time savings, documentation issues, and the enhanced program value.

## **Methods**

### **Setting**

The pilot study was conducted at two sites in Washington, during the summer of 1999. U.S. Naval Hospital Bremerton (NHB) is the principal naval inpatient medical treatment facility in the Pacific Northwest. NHB is licensed for 139 beds, and is located in the Kitsap Peninsula, on Ostrich Bay. Three family practice clinics with 48 providers were assessed as part of the study. Another U.S. Navy facility, Everett Branch Clinic (EBC), is located on the Puget Sound. There is one general practice clinic at EBC, encompassing nine providers. The main study occurred at USNH Keflavik from January 2001 to September 2002. There were 19 inpatient beds at Keflavik, as well as an outpatient clinic and fifteen providers. The pharmacy refill clinic is available to more than 4,200 users residing on Naval Air Station Keflavik, Iceland.

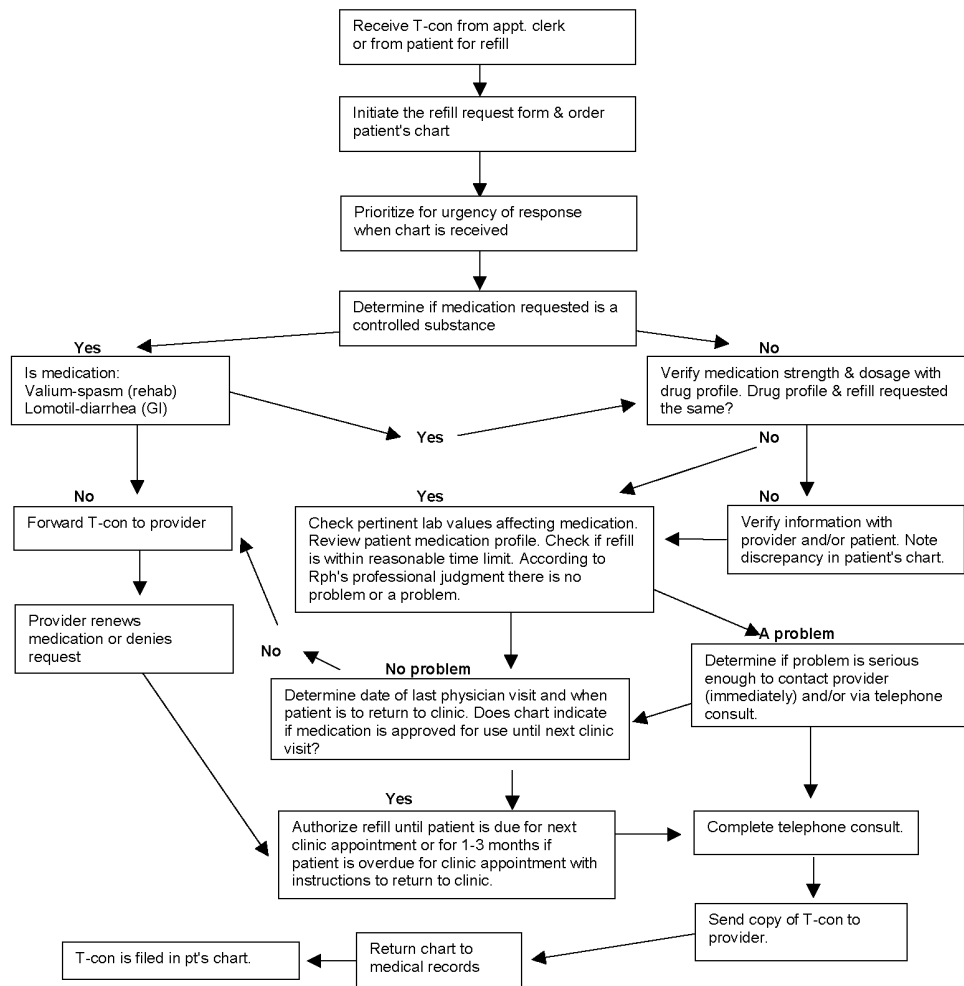
### **Clinic procedure**

When a patient needed a renewal on a chronic medication before the pharmacy refill clinic was in place, they could either telephone for an appointment or a telephone consult (T-con) with a nurse. A flow chart of the refill clinic procedure is diagrammed in Figure 2. The refill clinic obtains patients in three ways: (1) through a patient call to the pharmacist for a telephone consult (T-con); (2) when a patient calls the pharmacy and is informed there are no refills available on their existing prescription; and (3) when the patient comes directly to the clinic because their provider is unavailable. Using the 89 drug protocols, the pharmacist reviews the patient's medical record, lab values and prescription refill history to determine if the patient's condition is stable on the current medication and whether to continue the same drug and dosage. These protocols allowed the providers the confidence of knowing how a pharmacist will react in every conceivable situation.

The pharmacist checks lab values, prior appointments, next appointment date, concurrent medications, compliance to refill schedules, and, using the specific drug category, asks questions developed from the flow diagram regarding adverse effects.

The clinical pharmacist asks the patients about over-the-counter medications and herbal preparations, which is very important in medication safety, as many herbal products can interact with legend drugs. St. Johns Wort, for example, is a serotonin reuptake inhibitor. When taken in conjunction with Prozac, this herbal preparation could cause a serotonin crisis. After the pharmacist renews the medication, the provider is informed via a printed T-con message that later goes into the patient's medical record. The discussion between the pharmacist and the patient, and the evaluation of their chronic health state, ensures that the patient continues to take their medication in an appropriate manner. The elapsed time from the patient's call to the prescription refill entry and the return call from the pharmacist to the patient is usually 24–48 hours.

Figure 2. Pharmacy refill clinic flow chart



The physician who served as director of the family practice clinic at Keflavik reviewed 10 percent of the Pharmacy Refill Clinic medication renewals. Peer review also was used successfully in a Veterans Administration (VA) medical center to evaluate and monitor the care provided by the pharmacist.<sup>14</sup> The standard operating procedures for the refill clinic can be found in Appendix 1.\*

## Data collected

Instances of pharmacist interventions that enhanced patient safety and originated with the pharmacy refill clinic were recorded. The dollar value of these interventions is not quantifiable, however, they were viewed as improving the patient's quality of life. Cost savings accrued by the pharmacy refill clinic were estimated from (1) data collected on hours saved, (2) hourly wage comparisons of physicians and pharmacists, and (3) money saved through alterations of therapy to less-expensive or lower-dosage medication. The volume of refills was quantified

\* Appendices cited in this report are available on request at [vjriege@us.med.navy.mil](mailto:vjriege@us.med.navy.mil).

by drug category to illustrate which types of health problems were associated with an increased use of the pharmacy refill clinic. Refill volumes were also tabulated by day of week and month of year to provide additional data that may help in staffing the refill clinic.

## **Results**

### **Pharmacist interventions**

One elderly patient identified through the pharmacy refill clinic was taking an acute skeletal muscle relaxant medication for nearly a year; it was originally prescribed for injuries sustained in an automotive accident. Early in his recovery, when the patient asked for his prescriptions to be renewed, all drugs that were current were renewed by his provider's nurse. Months later, the patient contacted the pharmacy refill clinic to request renewals and he was questioned about his skeletal muscle pain. He mentioned that he was not experiencing any pain, but that he had been involved in a car accident about a year prior. The patient was taking a medication intended for short-term care—and had been taking it for nearly a year. This was a significant patient safety concern, as skeletal muscle relaxants often cause people to feel dizzy and drowsy, and this patient confirmed that he had been experiencing those feelings. Elderly people are at a higher risk for falls resulting in serious injury, and when a person is dizzy and drowsy the chances of a serious fall are increased. When an elderly patient falls, serious injury may occur. This patient was very grateful when this medication was discontinued. He later stated that he felt clear-headed again, after a year of being in a fog.

Some patients experienced side effects that were treated with a secondary drug. A pharmacist staffing the pharmacy refill clinic identified those patients with co-morbidities and with careful pharmacological management made recommendations to the physicians that minimized the unwanted side effect and maximized the desired treatment, while eliminating the second drug.

When questioned about how they were taking their medications, several patients revealed that they were not following the instructions properly. For example, a patient on a diabetic medication who did not follow the instruction to take the prescription with food could end up with an upset stomach and nausea. Rather than taking the medication as prescribed, the patient then might choose to minimize the daily dose. Once the pharmacist explains to the patient the importance of taking the medication with a meal, the patient will no longer experience adverse side effects and will, in turn, take the medication as directed. Moreover, this compliance would help to minimize future complications resulting from a failure to properly control the patient's diabetes, such as eye problems, circulatory issues, and kidney failure. The pharmacist's intervention for patients with multiple disease states further increases safety by reducing mortality and morbidity associated with an improperly contained disease state.

## Cost savings

In the pilot study conducted at Naval Hospital Bremerton and the Everett Branch Clinic, 290 prescriptions were renewed at the refill clinics over 3.6 weeks. Prior to the creation of the refill clinic, a provider needed about 2 minutes to log in to a computer and co-sign a prescription that a nurse had entered. At 2 minutes each, the 290 filled prescriptions translated to 580 minutes (9 hours, 40 minutes) of provider time. Nurses are not permitted to enter the psychiatric and controlled substance medications, however, pharmacists may do so. Renewals for 33 psychiatric and controlled substance prescriptions (at 10 minutes of provider time each) translated to 330 minutes (5 hours, 30 minutes). The amount of time saved during the 3.6-week pilot intervention totaled 15 hours, 10 minutes. Using the Military Composite Standard Pay Scale for 2000, a captain (provider) would have been paid at the rate of \$63.66 per hour, which translates to \$965.51 for the total time needed to authorize the prescription renewals. A lieutenant (pharmacist) would have been paid at the rate of \$39.43 per hour, or \$598.02 for the same period. The \$24.23 difference in the hourly rates paid to the provider and the pharmacist would result in an estimated savings of \$367.48 over the period of the pilot study.

Similarly, the USNH Keflavik's Pharmacy Refill Clinic renewed 594 prescriptions for 573 patients, during a 21-month trial study period. The opportunity costs saved are \$94,259, as \$164.50 per 20-minute appointment (\$94,259/573 patients). A pharmacy refill T-con takes 5 minutes, on the average, at a cost of \$41.13. Multiply that expense by 573 patient encounters and the labor costs total \$23,567. If the same patients each had an appointment with a physician, the labor costs would have totaled \$94,259. The cost savings benefit for using pharmacists to verify the treatment regimen and provide patients with medication prescription renewals was \$70,691 for the 21-month pilot program conducted at the USNH Keflavik Pharmacy Refill Clinic. The results suggest that stable patients obtaining prescription renewals on long-term use medications from a pharmacist at a refill clinic saves the physicians and nurses time, which in turn saves money.

A bonus savings occurs when the pharmacist renewing the medication realizes that a patient is taking two tablets, when they could be taking one. One patient, for example, was switched from taking two 10 mg Lisinopril tablets to taking one 20 mg Lisinopril tablet. This one case resulted in a drug-acquisition savings of \$102.20 per year. This patient had been on the two-tablet regimen for 5 years, and so the cost savings might have been as much as \$511, had the patient been taking the 20 mg tablets from the time treatment had begun. Another patient was switched from taking two 20 mg Lovastatin tablets to taking one 40 mg Lovastatin tablet. The resulting drug acquisition cost savings was \$47.45 per year. Pharmacists are more familiar than physicians with the concentrations of various drugs.

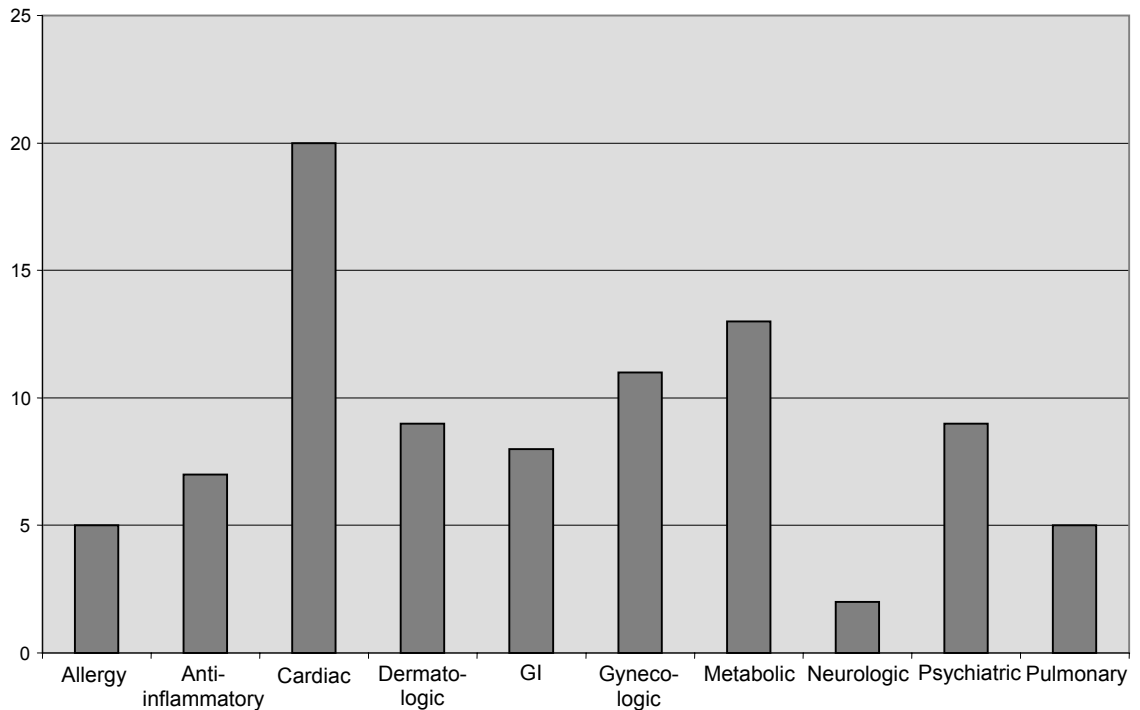
There are cost savings that can be attributed to good patient care. If a patient's condition is controlled on one medication and a less expensive medication in the same class has the same effects, this translates to a cost savings for the pharmacy.

In the four months prior to March 2004, the pharmacist at Keflavik switched eight patients from 180 mg Allegra tablets to 10 mg Claritin tablets, at a cost savings of more than a dollar per tablet. Each prescription change saves the hospital \$360 per year.

### Refill volumes by category and time frame

Medication refills were tabulated by drug categories during the 21-month pilot study at Keflavik (Figure 3). The categories included were: allergy, anti-inflammatory, cardiovascular, dermatologic, gastroenterologic, gynecologic, metabolic, ophthalmologic, psychiatric, and pulmonary. The cardiovascular drugs were refilled most often (21 percent), at a rate well above the second category, metabolic medications (13 percent).

**Figure 3. Percent of drug categories for Keflavik Pharmacy Refill Clinic**  
% of Drug Categories



Cardiovascular drugs include angiotensin converting enzyme inhibitors, angiotensin II receptor antagonists, beta-blockers, calcium blockers, centrally active agents, Digoxin, Dipyridamole, Disopyramide, diuretics, potassium-sparing compounds, potassium-wasting compounds, Gemfibrozil, HMG-CoA reductase inhibitors, niacin, nitrates, potassium, Procainamide, Quinidine and vasodilators. Metabolic medications include biphosphonates, Calcitonin, calcium supplements, hyperuricemia medications, insulin, oral hypoglycemics, and thyroid medications.

In the pilot study at USNH Bremerton and the Everett Branch Clinic, 290 prescriptions were processed over a data collection period of 18 days for an average of 16 prescriptions per day (Table 1). In this table the daily breakdown



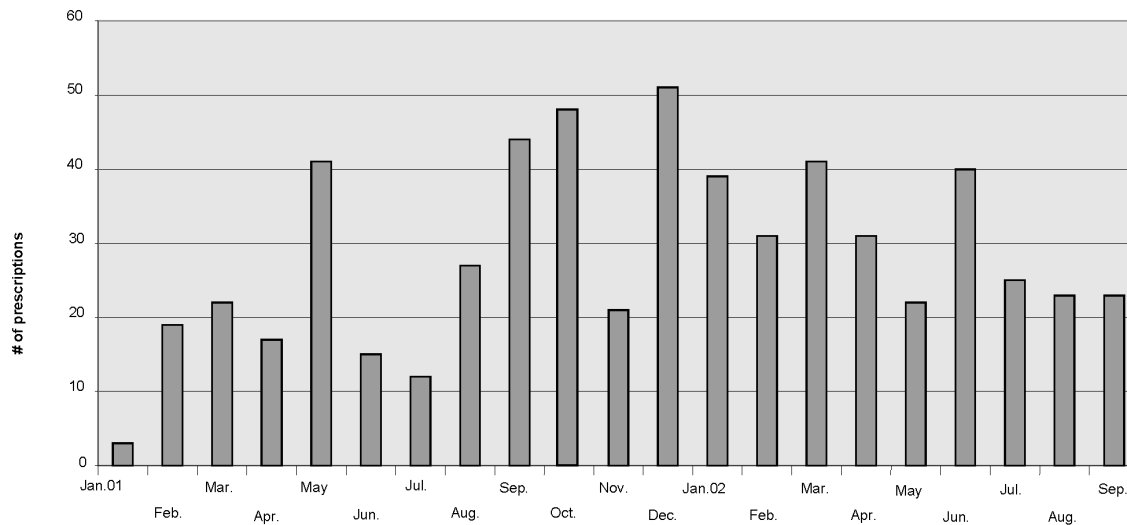
shows that Monday (26) and Fridays (21) are the busiest days. This could be helpful in staffing pharmacists. If an institution was short handed, then it would be beneficial to have the clinic on Monday, Wednesday, and Friday.

The monthly volume of renewals in the main study at Keflavik is shown in Fig. 4. Volume was generally lower during the first seven months, as patients grew accustomed to the service availability and the appointment clerk became acquainted with the process. Renewals ranged from 21–51 per month, during the last 14 months of the study.

**Table 1. Number of prescriptions renewed per day at Naval Hospital Bremerton and Everett**

	Mon.	Tues.	Wed.	Thurs.	Fri.	Rx/wk	Avg. Rx/day
8/18–8/20	-	-	9	5	24	38	12.70
8/23–8/27	24	5	15	18	10	72	14.40
8/30–9/3	18	14	13	8	19	72	14.40
9/6–9/10	Labor Day	4	18	19	32	73	18.25
9/13	35	-	-	-	-	35	35.00
Total	77	23	55	50	85	290	16.10
Avg. per day	25.7	7.7	13.75	12.5	21.3		

**Figure 4. USNH Keflavik’s pharmacy refill clinic volume, by month**



## Discussion

The results suggest that obtaining renewals of often-needed medications through the pharmacy refill clinic is more efficient than accessing them through the provider or consulting nurse. The benefits to the provider include: (1) saved

time (the provider is not required to authorize prescriptions entered into the computer system by the nursing staff), (2) pharmacists are often more accessible and available to discuss different drug therapies, (3) providers have more time in this practice model to diagnose patients, and (4) valuable appointment time is made available for acutely ill patients that must be seen by a provider. Benefits to the nursing staff include: (1) time spent entering medications and laboratory tests into the computer system is reduced, (2) more time can be allocated to patient care and training, (3) pharmacists are easily reached, in the event of medication questions, and (4) physician prescription authorization delays are reduced (since the pharmacist enters the physician's verbal order, the nurse is not made to wait for the authorization).

The clinical pharmacist is empowered in this revised practice model to facilitate the work they know best—drugs. The clinical pharmacist is given the opportunity to discuss with patients such issues as adverse drug effects, medication compliance, drug interactions (including herbal medications), over-the-counter medications, and food. The pharmacist also can, if necessary, explain the proper techniques of taking medications which affects the patient's safety and well-being. Upon interpreting a patient's laboratory values, the clinical pharmacist would contact the provider if there are values of concern or to recommend a therapeutic change intended to optimize the patient's care. Part of the medication renewal process involves checking the patient's blood pressure or performing a blood glucose finger stick, if necessary, for the category of drugs being requested.

Prior to the establishment of the pharmacy refill clinic, a patient had scheduled an appointment to see their physician. The physician would request laboratory samples to be drawn, and sometimes the patient would be ordered to return on another day if the lab test necessitated a dietary fast, prior to having the sample drawn. The patient then would be asked to return for a followup appointment, when their medications would be adjusted or changed. The process required two appointments and as many as three trips to the clinic. Patient safety is improved immensely when the pharmacist requests the lab test prior to the patient's appointment, as it expedites patient treatment and improves less effective therapies sooner. The pharmacist would use a flow diagram for each drug category to assist them in determining which lab tests to request. This revised process enables the physician to have the necessary lab values in hand, when determining if the patient's therapy has been optimized. Benefits to the patient include increased overall efficiency of care, attention to specialized personal drug needs, and faster prescription medication acquisition.

When a patient requests a prescription renewal from the pharmacy refill clinic, the pharmacist checks to see when the physician expected to see the patient for a followup appointment. Many times patients prefer to refill their prescribed medications and do not wish to see the physician for their followup appointment. In such cases, the pharmacist will renew the medication only until the patient can be seen by their physician. This ensures that the patient's care is being evaluated periodically, which may assist in detecting new health problems. Early detection

of diseases permits earlier treatments, which enable the patient to grow older with the best possible health state.

The pharmacists may discover upon reviewing labs and discussing adverse events with the patient that the patient had not complied with the prescribed therapy. Based on this discovery, the pharmacist can discuss with the physician whether another drug may be better suited to the patient and their circumstances. The revised drug therapy may help save the patient from a stroke or heart attack, an outcome which, from the perspective of the patient's loved ones, is invaluable and beyond cost analysis. Kucukarslan, et al.<sup>15</sup> found that involving the pharmacist in medication renewals contributed to a significant reduction in preventable adverse drug reactions.

Currently, among the U.S. Navy pharmacies, there are two additional sites that claim to have implemented pharmacy refill clinics. They are San Diego, CA, and Great Lakes, IL. These sites, however, are not functioning in accordance with the design of the pharmacy refill clinic in this study. In the San Diego and Great Lakes systems, a patient will occasionally arrive at the pharmacy window for a refill on a prescription that has no authorized refills remaining. At that point the pharmacist provides with a one-month refill to ensure the patient does not run out of their medication before they can see their provider. Neither of these locations renews more than 4–5 prescriptions per week.

## **Conclusion**

The pharmacy refill clinic supports patients with many safety drug parameters. The clinic staff ensures that the patient gets the appropriate medication, at the correct dose, to achieve the best disease state outcome. They further arrange to get patients in for annual examinations and schedule appropriate lab tests, en route to the best outcomes. The pharmacy refill clinic demonstrates that a trained pharmacist can capture appointments for the acutely ill patient, in addition to expediting prescription renewals for chronic patients—often at a reduced cost to the hospital. Pharmacy refill clinics are part of our future. As growing time constraints add to the burden of all medical personnel and physicians find themselves with less and less time for each patient appointment, it will become increasingly necessary to utilize the pharmacist for knowledge that best supports the patient's optimal drug regimen and their awareness of medication safety.

Further research is needed with respect to pharmacy refill clinics, their potential cost savings, and quality of patient care they provide. The additional ramp-up time would also would help physicians and nurses time to become accustomed to the practice. Moreover, patients also will need to be educated in the finer points of this new medication provision strategy. Appropriate methods to determine continued patient satisfaction have been developed and can be made an effective part of future research.<sup>16, 17</sup> From my experience at the refill clinics, the position of the pharmacist as a manager of chronic drug therapy is a viable one with considerable potential.

Now is optimal time to frame plans for expanding the pharmacy refill clinic concept worldwide.

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