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The Prescription Pick-up Lag, an Automatic Prescription Refill Program, and Community Pharmacy Operations

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Background

The current reimbursement model under which pharmacists are only paid for a dispensed drug product encourages a focus on prescription volume and dispensing speed. As a result, in an effort to increase patient satisfaction and loyalty, a number of community pharmacies have offered prescription time guarantees.(1,2) However, a survey conducted by the Institute for Safe Medication Practices (ISMP) found that 49% of pharmacists felt that time guarantees were a significant factor contributing to medication errors in community pharmacies.(3) ISMP concluded that the unrushed pharmacist and unhurried patient will contribute to fewer medication errors. One way to accomplish these goals would be to decrease the frequency of patients that request 'urgent' prescription fills in the pharmacy.

Automatic prescription refill programs may help accomplish these goals. Automatic prescription refills have become commonplace in community pharmacy over the last several years.(4,5) These programs initiate prescription refills on a standardized, recurrent basis up to one week prior to a patient running out of medication. This removes the need for patients to drop medication refills off at the pharmacy or telephone prescriptions in as is required for manually refilled prescriptions. Depending on the pharmacy's algorithm, prescriptions in the automatic prescription refill programs are queued in the dispensing software and filled up to 7 days in advance of the prior prescription running out. This means that an automatic prescription refill for a 30 day supply would be generated 23 days after that medication was last picked up. These programs are viewed anecdotally as a method for improving patient medication adherence and subsequently Center for Medicare and Medicaid (CMS) Star

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Ratings Program.(6) However, a potentially important side effect is the changes to pharmacist work as a result of fewer ‘urgent’ prescriptions.

In an automatic refill program, prescriptions are likely initiated sooner for processing compared to manual refill prescriptions. However, an automatic prescription refill program only addresses initiation of the refilling and does not directly address the patient picking up the prescription. As a result, it is reasonable to hypothesize that the amount of time in the pharmacy would be longer with automatic prescription refills compared to manual prescription refills. This time period has been coined by the authors as the “prescription pickup lag.” After the prescription refill is initiated by either the automatic refill program or the patient, the prescription pickup lag includes the time in between when the refill is adjudicated and when the patient picks up of a prescription. During the prescription pickup lag, pharmacy staff processes the prescription including the counting and verification of the prescription. Figure 1 provides a graphical representation of the hypothesis.

The purpose of this study was to measure the differences in the prescription pickup lag time for automatic prescription refill programs compared to manual refill prescriptions.

Methods

A post-only quasi-experimental design was used for this analysis. This type of design is appropriate since patients were not randomized to enroll in the automatic prescription refill program at the pharmacy chain. Patients were separated into automatic and manual prescription refill cohorts and data was collected for the 2014 calendar year. This study was approved by the authors institution’s IRB.

Data Source

Prescription claims data were obtained through a 29-store independently owned pharmacy chain in the Midwest. The majority of these pharmacies are located in small and medium sized towns. Variables that were included in the data file were patient age, gender, National Drug Code, prescription adjudication date, prescription pick up date, days’ supply, drug name, directions for use, quantity supplied, and automatic refill status.

Patient Population

Inclusion criteria for this study were patients over the age of 65 taking at least one of the following medications: HMG-CoA reductase inhibitors (*i.e.*, *statins*), angiotensin-converting enzyme inhibitors (ACE-I), angiotensin-II receptor antagonists (ARB), sulfonylureas, biguanides, dipeptidyl peptidase IV (DPP-4) inhibitors, thiazolidinediones, and subtype II sodium-glucose transport protein (SGLT2) inhibitors. These medication classes were selected based on their use in the CMS Five Star Rating Program. This was important for a separate analysis conducted by the authors. In the current analysis, the medication classes were analyzed separately to show consistency of the prescription pickup lag across the three groups. Patients taking one of these medications had to have at least 2 prescription fills of that medication during the 2014 calendar year. The first fill had to occur at least 91 days before the end of the calendar year. This ensures that patients receiving 90-day supplies of medication were able to obtain a second fill during the observation period. Patients that had

the same medication filled in the automatic refill program and the manual refill program were not included in the analysis. This was done to isolate the effect of being in only one of the two programs.

Data Analysis

A comparison between the automatic and manual prescription refills for the prescription pickup lag was calculated. The prescription pickup lag was determined by subtracting the prescription adjudication date from the prescription pickup date for each prescription refill during the observation period:

$$\text{Prescription Pickup Lag (days)} = \text{Prescription pickup date} - \text{Prescription adjudication date}$$

This calculation provided the number of days a prescription was in the pharmacy after being adjudicated by the pharmacy staff and before being picked up by the patient. Since the distribution of days was not normally distributed, the nonparametric Mann Whitney U test was used to determine if there were significant differences in the number of days an automatic prescription refill spent in the pharmacy queue compared to manual prescription refills. Non-parametric effect size calculations, using Cliff's Delta and Vargha and Delaney A measure, were performed to determine the magnitude of those differences. Nonparametric tests are considered more robust compared to parametric tests since they do not make assumptions about the distribution of the data and are not violated when the data lack normality.(7)

Since this is a quasi-experimental design and sample groups were not randomized or matched, a Mann Whitney U or Chi-Square test was performed to see if significant differences existed between each comparator group. For any significant differences found from the Mann Whitney U test, an effect size calculation was performed using Cliff's delta and Vargha and Delaney's A. Romano et al suggests that thresholds of negligible (<0.147), small (<0.33), medium (<0.474), and large (>0.474) can be used to help interpret the results. (8) All data cleaning, pre-processing, and statistical analysis was performed using R (R Development Core Team (2008). *R: A language and environment for statistical computing*. R Foundation for Statistical Computing, Vienna, Austria. URL <http://www.R-project.org>).

Results

There were a total of 37,207 claims included in the analysis. Statins were the most commonly filled medication metric. The number of patients enrolled in each automatic prescription refill group was between 20.5% and 23.3% of the total number of patients for each medication group. Table 1 provides the demographics for each of the three medication groups by refill type.

Small, but statistically significant differences were found for the proportion of males to females in the automatic and manual fill medication groups for the statins and diabetes measures. Significant differences for statins, rasa, and diabetes measures were found for the number of chronic medications patients took at the 95% confidence interval. The estimated difference for each measure was approximately one additional prescription in the automatic

prescription refill groups. The effect size for each of these measures was negligible. Overall, the patients were well matched on the available variables considering the quasi-experimental nature of the data. It is important to note, however, that it is possible there are other significant different differences between the patients in each refill type that were not captured in the data.

For automatic prescription refills, the mean prescription pickup lag was approximately 9 days for each of the measures. This compares to manual refill prescriptions which were in the pharmacy for a mean of 3.5 days. Median pickup lag times were 7 days and 1 day for automatic and manual refills, respectively. There were 35.2%, 36.0%, and 33.8% of the manual refill prescriptions that had a prescription pickup lag of zero days for the statin, renin angiotensin aldosterone antagonists (RASA), and diabetes groups, respectively. This compares to 12.4%, 13.8%, and 12.9% for the automatic prescription refill groups. For prescriptions that had a pickup lag of more than 14 days, there were 15.6%, 14.8%, and 16.2% of prescriptions in the automatic refill group compared to 4.5%, 4.7%, and 5.6% of prescriptions in the manual refill groups for statin, RASA, and diabetes groups, respectively. Descriptive statistics for each measure by refill type can be found in Table 2.

A comparison of the difference in time between the two refill types is presented in Table 3. The Mann Whitney U test found that automatic prescription refills were in the pharmacy queue 4–5 days longer when compared to the manual refill prescriptions for each measure ($p < 0.001$). Cliff's delta which measures the magnitude of the difference found that all of the differences were considered to have a large effect. Vargha and Delaney's A provides a simple interpretation of the estimate. For example, the A measure for statins says that there is a 77% chance that a randomly selected observation from the automatic refill prescription group will have a greater time in queue compared to a randomly selected observation from the manual refill prescription group.

Discussion

The results of this study show that the prescription pickup lag for automatic prescription refills was significantly longer, compared to manual prescription refills. Automatic prescription refills had a median prescription pickup lag of six days greater when compared to the manual refill prescriptions. Manual refill prescriptions were more likely to have a prescription pickup lag of zero and automatic refill prescriptions were more likely to have a prescription pickup lag of greater than 14 days.

Other studies have found that prescription processing steps typically occur in minutes rather than days.⁽⁹⁾ In some cases, delays in processing a prescription result in hours or days to complete the order including prior authorization, ordering drug inventory, and contacting a physician for refills. Once a prescription has been verified by the pharmacist, it sits in the will-call bin until the patient arrives at the pharmacy to pick the medication. Based on the results of this study, automatic prescription refills tend to spend a median of six days longer in the pharmacy from the date they are adjudicated by the pharmacy staff to when they are picked up by the patient. The amount of time the prescription spends in the will-call area before pharmacist counseling and patient pickup could be referred to as a bottleneck in

prescription processing.(10) This extended period of time in the pharmacy compared to manual refill prescriptions likely has several operational implications for the pharmacy.

Filling prescriptions early means that if a particular automatic prescription refill did not have any more refills or required a new prior authorization there is a buffer built into the dispensing time that allows the pharmacy staff to communicate with the prescriber to get the issue resolved before the patient stops into the pharmacy to pick up the prescription. In the case of a manual refill, a patient might stop into the pharmacy and expect to wait for the medication because they have no more tablets in the bottle, not realizing that the prescription has no more refills. The patient then has to be informed that the prescriber needs to be contacted for a new prescription and this may result in the pharmacy staff giving the patient three days' worth of medication while a response from the prescriber may be obtained. The pharmacy staff has to prepare the three days' worth of medication and the patient needs to make another stop to the pharmacy. The buffer is an example of resilience engineering where in a situation that threatens normal operation (*e.g., the prescriber needs to be contacted for a new prescription*), success still occurs (*i.e., the patient receives their full prescription*) because of built-in adaptations to the process.(13) The built-in adaptation is the implementation of automatic prescription refills so that issues arising with a prescription refill are resolved prior to the patient picking up their prescription.(14)

As a result of automatic prescription refills being initiated by the pharmacy staff up to one week before a patient could run out of medication, there is a decrease in the urgency of getting these prescriptions filled in a short time period. The more prescriptions that are designated as automatic prescription refills results in a decrease in the number of patients that drop off and wait for a prescription refill. This is evidenced by the findings of 13.0% of prescriptions in the automatic refill being picked up the same day as it was adjudicated compared to 35.2% for manual refill prescriptions. This decrease in urgency to fill prescriptions quickly through decreased workload has been reported to result in lower prescription errors and improvements in medication safety in community pharmacies.(11,12) Decreasing the number of urgent fills can also mean that pharmacists are not rushed when counseling patients, performing prospective DURs, or conducting medication reviews due to other patients waiting for their medications.

Another potential advantage of having a larger prescription pickup lag is to help manage inventory. Prescriptions that are very expensive might only be ordered when the automatic prescription refill is generated. The extra time allows the prescription to be placed on the order the day that it was generated and have it arrive the following day since community pharmacies typically receive an order from the wholesaler each business day. This prevents the pharmacy from purchasing a medication immediately after it was last filled and result in the medication sitting on the shelf for a longer time period in between prescription refills. This is especially important if the patient transfers the prescription to another pharmacy or calls to let the pharmacy know they are no longer taking that particular medication. By waiting until the automatic prescription refill is adjudicated, the pharmacy can submit the claim for billing and receive the copayment or coinsurance from the patient before they need to make payment to the wholesaler for the medication. This is in contrast to the reordering medication stock immediately after it was last filled resulting in the pharmacy paying the

wholesaler for the medication before the next month of medication is needed by the patient. In the case of manual refill prescriptions, it might be more difficult to predict when a patient will arrive at the pharmacy in need of the medication since it is possible they arrive the same day that it is called in to be refilled. If the pharmacy does not reorder the prescription after the last fill, then the patient might arrive for their refill the next month and find out that the medication is out of stock and needs to be ordered for the next business day.

Automatic prescription refills likely also have disadvantages and negatively impact the operations in the pharmacy. One potential issue is the result of rework. Several definitions have been proposed to define rework depending on the context it is being described.(15,16) In a community pharmacy, rework is a result of a prescription being filled, not being picked up for a certain time period, and being returned to the stock shelves. If and when a patient requests the prescription after it has been returned to stock, the pharmacy staff has to re-process the prescription by going through all the steps that had previously been completed. This study demonstrated that automatic prescription refills spend a longer time in the will-call queue compared to manual refill prescriptions. There were 15.4% of automatic prescription refills that had a prescription pickup lag of more than 14 days compared to 4.8% of manual refill prescriptions. As a result, there is potential that more automatic prescription refills are returned to stock since pharmacy staff may return prescriptions in will-call that have been in the queue for a certain amount of time. In most cases, pharmacies are contractually obligated to return any prescription that has been on the shelf for more than 14 days.(17,18) Pharmacies that do not adhere to this policy may be subject to corrective action. (17) To help ensure compliance with these regulations, pharmacies are audited by Medicare and pharmacy benefit managers to ensure that prescriptions have been signed for and picked up. The prescription pickup date, however, is not a piece of information that is automatically sent to CMS or pharmacy benefits managers. The findings indicate that the pharmacies did not always return these prescriptions to stock after 14 days. Some prescriptions were on the shelf for more than 300 days. This could be due to a patient filling a prescription at a different pharmacy or stopping and starting a medication during the year while the medication was in the will-call of the pharmacy.

Another potentially negative consequence of an increased will-call queue length for automatic prescription refills is the increased inventory costs. Prescriptions that are in the will-call queue may have already purchased more stock medication to replace the medication in the will-call queue. The prescriptions in the queue have been billed to the insurance plan, but have not been picked up by the patient. As a result, the pharmacy has had to purchase inventory and has not yet received payment from the patient. This has potential cash flow implications because prescription drug profit margins are low to begin with. (19,20) The pharmacy might be depending on the patient's portion of the payment to return a positive margin. If the prescription is sitting in the will-call queue for a long time period, additional cash flow reserves are needed to account for the excess inventory in the pharmacy and lack of pickup of the prescription by the patient.

Limitations

One limitation of this research is that there may have been significant differences between the automatic and manual refill prescription groups that affected the prescription pickup lag. Access to more detailed patient variables and possibly, a larger geographically diverse dataset, would have been helpful to further examine the differences between groups.

Conclusions

Automatic prescription refill programs likely have significant implications for accomplishing the work in a pharmacy. These can be both positive in that pharmacy staff can better predict their workload through decreased 'urgent' prescriptions and negative due to the potential for increasing the amount of rework in the pharmacy. Pharmacy managers and leadership should weigh the positives and negatives associated with the automatic prescription refill program when enrolling individual patients so that benefits are maximized consequences minimized. Further assessment of automatic prescription refill programs impact on pharmacist work needs to be explored.

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Key Points**Background**

- A focus on prescription volume and speed in community pharmacy has led to concerns about medication safety and errors.
- Automatic prescription refill programs have been developed to process prescriptions on a standardized recurrent basis.
- The role that automatic prescription refill programs play in impacting pharmacy operations is unknown.

Findings

- Automatic prescription refills have a greater mean prescription pickup lag compared to manual refill prescriptions.
- A larger prescription pickup lag can decrease the number of urgent prescription refills and minimize rushed prescription processing.
- A larger prescription pickup lag may result in greater inventory needs and cause rework of prescriptions by pharmacy staff.

Figure 1.

Table 1

Patient Level Demographics for each Measure by Refill Type

	Statin		RASA		Diabetes	
	Automatic	Manual	Automatic	Manual	Automatic	Manual
Sample Size	1058	4105	1054	3561	383	1260
Number of Claims	4844	12533	4668	11083	2311	5559
Gender (%)						
Male	52.5 ^a	48.5 ^a	47.6	47.7	55.1 ^a	51.8 ^a
Female	47.5 ^a	51.5 ^a	52.4	52.3	44.9 ^a	48.2 ^a
Mean Age ± SD	79 ± 10 ^b	80 ± 10 ^b	80 ± 11 ^b	80 ± 10 ^b	78 ± 9 ^b	79 ± 9 ^b
Mean Chronic Medications ± SD	8.5 ± 5.2 ^c	7.8 ± 5.6 ^c	8.3 ± 5.3 ^c	7.7 ± 5.4 ^c	10.4 ± 5.2 ^c	9.8 ± 5.9 ^c

Note: SD = Standard Deviation

^aChi-squared test, 1 df, p < 0.05

^bMann-Whitney U between study groups, p<0.05

^cMann-Whitney U between study groups, p < 0.05

Table 2

Prescription Pickup Lag for each Measure by Refill Type

Measure	Mean ± SD	Median	Inter-Quartile Range	Pickup Lag = 0 days	Pickup Lag > 14 days
Statins					
Auto Refill	8.9 ± 12.5	7	[3 – 12]	12.4	15.6
Manual Refill	3.3 ± 8.6	1	[0 – 3]	35.2	4.5
RASA					
Auto Refill	8.4 ± 10.6	7	[2 – 11]	13.8	14.8
Manual Refill	3.4 ± 9.3	1	[0 – 3]	36.0	4.7
Diabetes					
Auto Refill	9.1 ± 13.4	7	[3 – 12]	12.9	16.2
Manual Refill	3.8 ± 10.9	1	[0 – 3]	33.8	5.6
Overall					
Auto Refill	8.8 ± 12.0	7	[3 – 12]	13.0	15.4
Manual Refill	3.4 ± 9.6	1	[0 – 3]	35.2	4.8

Table 3

Prescription Pickup Lag Differences and Effect Sizes for each Measure

Measure	Mann Whitney U			Cliff's Delta		Vargha and Delaney A Estimate
	Difference	95% CI	p-value	Estimate	Size of Effect	
Statins	5.0	[4.0–5.0]	<.001	.53	Large	.77
RASA	5.0	[4.0 – 5.0]	<.001	.51	Large	.76
Diabetes	4.0	[4.0 – 4.0]	<.001	.51	Large	.75
Overall	5.0	[4.0 – 5.0]	<.001	.52	Large	.76

Note: A positive difference indicates that prescription pickup lag was greater with automatic prescription refills