

## Improving Comprehensive Medication Management (CMM) Completed Visit Rates in Newly Referred and No-Show Patient Cohorts

Michelle Tran, PharmD<sup>1,2</sup>; Yookyung Christy Choi; PharmD<sup>2</sup>, Amanda Brummel, PharmD, BCACP<sup>1,2</sup>; Heidi Burre, PharmD, BCACP<sup>1</sup>; Jean Moon, PharmD, BCACP<sup>2</sup>; Allyson Schlichte, PharmD, MBA, BCACP<sup>1,2</sup>; Kelly Schweim, PharmD, BCACP<sup>1</sup>

<sup>1</sup>Fairview Pharmacy Services, Minneapolis, MN; <sup>2</sup>University of Minnesota College of Pharmacy, Minneapolis, MN

### Abstract

**Background:** Missed appointments are a common problem in health care. No-show rates and incomplete appointments for referred patients affect patient outcomes and clinician's productivity, including comprehensive medication management (CMM) visits that pharmacists provide. This study aims to compare CMM completion rates between various intervention types in communicating with the patient.

**Methods:** This was a prospective, multi-clinic study to examine newly implemented intervention effects on CMM completion rates. The primary outcomes were CMM completion rates among newly referred patients and CMM completion rates in any no-show patients, including both newly referred and returning patients. In the newly referred patient cohort, three intervention types (blocking time on the pharmacist's schedule to speak to the patient, sending an electronic medical record or EMR-linked message, and sending a letter) were compared to a control group with no interventions. In the no-show cohort, a pharmacist call intervention was compared to a control group consisting of sending a letter.

**Results:** Completed CMM appointment rate was six times likely with a pharmacist's in-person reminder (odds ratio [OR] 6.0; 95% confidence interval [CI] 1.58-22.77) and with an EMR-linked message (OR 6.0; 95% CI 1.76 to 20.52) when compared to sending a letter. In no-show patients, completed CMM appointment rate was 2.36 times likely with a pharmacist's call intervention versus sending a letter.

**Conclusion:** Pharmacist's direct reminder to the patient when in clinic and EMR-linked message improved CMM completion rate when compared to mailing a reminder letter. Pharmacist's call to no-show patients for their CMM appointment was effective for the patients to reschedule and complete their CMM appointment compared to mailing a reminder letter.

**Keywords:** comprehensive medication management, CMM, medication therapy management, MTM, visit rates, no shows

### Introduction

Comprehensive medication management (CMM) is a standard of care process that ensures each patient's medications are individually assessed during a visit to determine that they are appropriate, effective, safe, and able to be taken as intended by the prescriber.<sup>1</sup> Previous studies and research have shown that CMM visits provided by a medication therapy management (MTM) pharmacist reduce hospital readmission rates by 33%.<sup>2</sup> By utilizing a MTM pharmacist, measures associated with chronic disease management can be improved. In a study looking at the impact of management of type 2 diabetes when pharmacists were added to a patient's primary care team, teams with a pharmacist were able to more significantly decrease A1c levels compared to teams without a pharmacist.<sup>3</sup> Assuming that a 1% decrease in A1c correlates with a 37% reduction in microvascular complications, the pharmacists added to the primary care teams were correlated with a 96% decrease in microvascular complications.

Additionally, other measures such as lipid levels and blood pressure were improved. The MTM pharmacist on the team was not only able to improve short-term clinical markers but also reduce estimated long-term cardiovascular risk by a 4.5-fold reduction in estimated 10-year risk of coronary heart disease and stroke.<sup>3</sup> Improving measures in chronic disease management improved both patient's health outcomes and quality measures for the health care team such as STAR ratings.

However, missed appointments and incomplete referrals are common challenges in health care delivery. An incomplete referral occurs when a newly referred patient fails to schedule and/or complete the referred visit. No-show rates and uncompleted appointments for referrals may be associated with negative patient outcomes and clinician productivity. A no-show appointment can be defined in a number of different ways: a patient that fails to appear, arrives too late for an appointment, or cancels with short notice to be able to schedule a different patient during their original appointment time.<sup>5</sup> A number of studies have been conducted on no show rates, looking at common reasons for patients missing appointments. No show rates vary between practices, providers, and a variety of factors have been found to play a role in patients not showing up to scheduled appointments. Demographic factors associated with higher no-show rates

**Corresponding Authors:** Michelle Tran, PharmD  
Fairview Pharmacy Services; Email: mtran9@fairview.org

Christy Choi, PharmD  
University of Minnesota College of Pharmacy  
308 SE Harvard St, Minneapolis, MN 55455  
Email: choix757@umn.edu

were younger age, lower socioeconomic status, and presence of mental health disorders.<sup>9</sup> Initial appointments have also been found to be more frequently missed than follow-up appointments when the patients have not had an established relationship with the healthcare provider, were less engaged, or did not fully understand the purpose of the clinic appointment.<sup>9</sup> In a study of 10 primary care and sub-specialty clinics over a 12-year period, the average no-show rate for all appointments was 18.8%.<sup>10</sup>

When a specialist referral is made, patients may choose to go forward with the referral and complete the visit with the specialist or not. Specialist referral completion rates ranged from 77 to 83% in the literature.<sup>6,7</sup> A variety of factors play a role in a patient's referral completion rate. The two most common reasons for incomplete referral in one study were found to be "lack of time" and patient belief that the "health problem had resolved." These reasons were mutually exclusive.<sup>5</sup> One study found that incomplete referrals were strongly associated with difficulty getting appointments quickly, locating the office, and inconvenient office hours.<sup>7</sup> Another contributing factor for incomplete referral was communication between the referring physician and the specialist. Referral tracking is an important task to ensure the referral was completed but is not always done.

Many different types of intervention strategies have been used across different health systems to address no-show events. Strategies such as reminder calls or texts, patient incentives, penalty fees for no-show, patient education, and discharging the patient from clinic, were used to help decrease appointment no shows.<sup>5</sup> Other strategies such as overbooking appointment schedules and same-day/urgent appointments were utilized to minimize the impact of no-show rates on the clinic.<sup>5</sup> Reminder calls and/or texts prior to appointments and further patient education have shown promising results in improving no-show rates. Probationary measures, such as implementing a no-show fee on select patients with multiple no-show appointments, have also proven to decrease no-show rates.<sup>5</sup>

Studies have shown that patients with frequent no-show appointments were less likely to have adequate preventative care, have worse control of chronic illnesses, and have increased rates of emergency department visits and hospitalizations.<sup>5,11,12</sup> In other words, improving completed CMM visit rates and reducing no show rates among newly referred patients may lead to a greater impact on patient outcomes and the health care system's performance. Under the assumption that improving CMM completion rates among patients newly referred to CMM services and reschedule rates for no-show patients would improve long-term patient outcomes, this study was conducted to examine the effectiveness of MTM pharmacist's interventions to reach out to no-show patients on overall CMM completion rates.

## Methods

### *Study Objectives*

The study aims to compare CMM completion rates between newly implemented intervention groups within the healthcare system to evaluate protocol in two different study cohorts: newly referred patient cohort (cohort 1) and no-show patient cohort (cohort 2).

### *Practice Setting*

The study was conducted within Fairview Health Services, a nonprofit organization and one of the largest health systems serving Minnesota. Fairview is a network of 12 hospitals and medical centers, 56 primary care clinics, 36 pharmacies, and almost 4,000 providers of primary care and specialty care. Included within this expanding network is the largest MTM program in the state with presence in 45 clinics and consisting of 36 clinical MTM pharmacists at the time of the study, including three pharmacy residents. There are four coordinators on the Fairview MTM team who help manage billing, schedules, and referrals.

In the Fairview system, referrals for CMM are often ordered by primary care providers, care team members, and pharmacists (in inpatient and community pharmacy). These referrals may be triggered by the identified need of the patient in the clinician visits or by criteria-based alerts, notifying the clinician that the patient could benefit from a CMM visit. The best practice alert (BPA) system triggers a CMM referral in the electronic medical record (EMR) by specific criteria, such as a patient's discharge from the hospital. Providers place CMM referrals for a variety of reasons such as patient education, if patients have medication questions, or for chronic disease management. Fairview pharmacists in the community pharmacy locations can also refer patients to CMM such as for uncontrolled blood pressure or asthma.

The coordinators have a standard process for contacting referred patients. The coordinators call these patients to schedule an appointment. A voice message is left if the patient does not answer. When the coordinators are unable to reach the patient after two attempts, the MTM pharmacist at the patient's clinic and the patient's healthcare team are notified through the EMR. However, follow-up strategies upon the notification are not consistent within the system. Some pharmacists do not act on the notification at all and some act by sending a letter to the patient regarding the referral. Newly referred patients that receive no action are referred to as the control throughout the study. This project aims to standardize these follow-up strategies through the study interventions.

### *Study Design*

This study was a prospective, observational study conducted in multi-clinic within a single healthcare system setting to examine newly implemented intervention effects on CMM completion rates in two cohorts. The primary outcomes were CMM completion rates among newly referred patients (cohort

1) and CMM completion rates in any no-show patients, including both newly referred and returning patients (cohort 2). This study utilized EMR chart review to capture all data pertaining to CMM referrals, completed CMM visits post referral, and scheduled CMM visits yet to be completed. Interventions occurred from December 2018 through February 2019, starting a week post implementation date of the system-wide standardized intervention protocol. In both cohorts, patients were excluded if they received short consultations (e.g. medication education visits) rather than a full CMM service or passed away during the study period. Figure 1 summarizes the study design by cohort.

#### Newly referred patients (cohort 1)

When the coordinators were unable to reach newly referred patients to schedule a CMM appointment, the coordinators notified a pharmacist at the patient's designated Fairview clinic through the EMR system. There were 3 interventions: pharmacist's blocked time, EMR-linked message, and sending a letter. The coordinators checked when the patient would be in the designated clinic and made a 30-minute blocked time on the pharmacist's schedule. The pharmacist was to then attempt to speak to the patient during that blocked time to either complete a CMM visit or schedule the patient for a CMM visit. If a patient was not coming into clinic within the month or was unable to have a blocked intervention as described above, then a letter intervention could be mailed to the patient's home address or an EMR-linked message intervention was sent regarding the referral. The EMR-linked message sends a message to the patient regarding the referral. A CMM visit was defined to be completed if the CMM appointment was scheduled within two months of the intervention date and completed by the end of March 2019.

#### No-show patients (cohort 2)

When patients did not show up to their CMM appointment within the 15 minutes from the appointment time, the intervention was a pharmacist's call to the patient. If time allowed, the pharmacist could complete the visit if the patient was reached via phone, otherwise reschedule the CMM appointment. If the patient was not reached, a voice message was left. Patients in the control group received a mailed letter without the pharmacist's call as the standard practice within this healthcare system. A CMM visit was deemed to be completed if the rescheduled appointment was completed within two months of the missed appointment date or completed by the end of March 2019. Patients were further excluded if a voice message was not left from the pharmacist's call.

#### *Statistical Design and Analysis*

The primary outcomes were CMM completion rates in both cohort 1 and 2, and secondary outcomes were CMM appointment reschedule rates. In cohort 1, the primary testing hypothesis was that CMM completion rates in the newly referred patients would differ between intervention and

control (no intervention) groups, with an exploratory hypothesis to identify more effective intervention types. In cohort 2, the primary testing hypothesis was that CMM completion rates among no-show patients would differ between pharmacist's phone-call intervention and control (mailing a letter).

$\chi^2$  (chi-square) tests were used to examine associations between the measured study outcomes and the comparison groups. All reported p-values were 2-sided and considered statistically significant at  $< 0.05$ . In cohort 1, if statistical significance was met to support different CMM completion rates by interventions, pairwise comparisons between the 3 intervention groups and control were then performed by odds ratio (OR) to identify more effective intervention types. In cohort 2, if there were statistically significant differences in CMM completion rates between intervention and control, we further investigated CMM completion rates between the call intervention statuses: Reached (i.e. a pharmacist spoke with the patient) and Not Reached (i.e. a pharmacist left a voice message). A binary logit model was fit to examine whether the probabilities of CMM completion differed by the intervention status. All statistical analyses were performed using SAS software (version 9.4; SAS Institute Inc, Cary, NC).

#### **Results**

##### Completed CMM Visits in cohort 1

Of the 174 newly referred patients in cohort 1, three were further excluded due to receiving more than one intervention. Of the remaining 171 patients, 15 received a block intervention, 20 received an EMR-linked message intervention, 60 received a letter intervention, and 76 received no intervention (control). Overall, 34 (19.9%) of the 171 newly referred patients completed the CMM visit. The CMM completion rates differed between the intervention groups. Six (40%), 8 (40%), 7(10.7%), and 14 (18.4%) patients completed their CMM visit in block, EMR-linked message, letter, and control groups, respectively ( $P=0.0104$ ). From pairwise comparisons between the intervention groups, patients in the block and EMR-linked message intervention groups were six times likely to complete a CMM visit compared to sending a letter. The odds ratio (OR) was 6.0 (95% confidence interval [CI] 1.58-22.77) with block intervention and OR was 6.0 (95% CI 1.76 -20.52) with an EMR-linked message intervention. There were no statistically significant differences in CMM completion rates between sending a letter versus control or between block and EMR-linked message. The pairwise comparisons in OR are summarized in Table 2.

##### Completed CMM Visits in cohort 2

Among patients with a no-show appointment in cohort 2, 152 patients received a phone call from the pharmacist as the intervention and 71 patients received a mailed letter (control). Overall, 73 (48%) of no-show patients who received a pharmacist's call completed a CMM visit, whereas 20 (28%) of no-show patients receiving a letter (control) completed a visit.

The CMM completion rate among no-show patients who received a pharmacist's call was 2.36 times the CMM completion rate of no-show patients without the call intervention (OR 2.36; 95% CI, 1.28-4.32;  $P=0.0057$ ).

We further categorized the phone call intervention group into two intervention statuses: Reached, which was a subset of patients in the call intervention group that the pharmacist spoke directly via phone and Not Reached, the other subset of patients that the pharmacist left a voice message. Of 152 patients who received the pharmacist call after missing the CMM appointment, 57 (37.5%) were Reached and 95 (62.5%) were Not Reached. The CMM completion rate was higher in Reached than in Not Reached with 63% and 39% CMM completion rates, respectively ( $P=0.0043$ ). There was no significant difference in CMM completion rate between Not Reached and control. See Table 3. The CMM completion rate in Reached patients was 4.37 times the completion rate in patients without the call intervention (OR 4.37, 95% CI 2.07-9.22).

As secondary outcomes, CMM reschedule rates were also examined. Overall, 90 (59%) of no-show patients who received a pharmacist's call rescheduled the CMM visit, whereas 29 (41%) of no-show patients with a mailed letter rescheduled. By intervention statuses, of those that were reached, 50 (88%) rescheduled the CMM visit compared to 40 (42%) who were left with a voice message rescheduled. There was a statistically significant difference in reschedule rates between the pharmacist's call intervention and control ( $P=0.0104$ ). As exploratory analysis, 17 of 90 rescheduled patients in the intervention group missed their rescheduled appointment (18.9% second-time no-show rate), and 9 of 29 rescheduled patients in the control group missed their rescheduled appointment (31% second-time no-show rate). However, this difference in these subsequent no-show rates were not statistically significant ( $P=0.168$ ).

### Discussion

In the newly referred patient cohort, block intervention and EMR-linked messaging were more effective when compared to sending a referral letter. As technology is further incorporated into healthcare, the argument may be made that patients want healthcare technology updated and easily accessible in mechanisms such as EMR-linked messaging systems. This study may provide some premise to say that patients are more engaged if online tools such as EMR-linked messages are made available and utilized for patients. Additionally, blocking time on a pharmacist's schedule as an intervention can be challenging to arrange for the healthcare team and pharmacist because it depends on pharmacists' availabilities during the patient's clinic visit, and patients may not have a scheduled visit within the 1-month time window. Such challenge is evident in this study as there were only 15 block interventions. Blocking time to remind patients to make a referral appointment may be time constrained to provide on a regular

basis and possibly lead to decreased productivity. EMR-linked messaging can be explored further as an efficient interventional approach.

Based on literature review to the authors' knowledge, this study is the first to look at CMM completion rates in newly referred patients and in patients after missing a scheduled CMM appointment in a clinic setting. In general, studies involving CMM specific referrals and completion rates are scarce. In existing literature, many have investigated into perceptions on other specialty practice referrals and reasons for patients not completing a referral. Studies on CMM practice are limited to implementing a referral program or increasing the number of referrals but not on improving the completed visit rates from already obtained referrals.<sup>13,14</sup> Many of the studies available on CMM visits are also currently in the community pharmacy rather than a clinic setting. This may be due to varying definitions of a CMM practice in different geographical areas and are not all equivalent to the services provided to patients in this study.

There are a few study limitations to note. First, there was an imbalance in intervention group sizes, which may have led to wide 95% confidence intervals in the pairwise comparisons with 'block' and 'EMR-linked message' interventions. However, all statistical assumptions of chi-square testing were met, and therefore the observed differences in CMM completion rates are statistically valid. A potential misclassification of intervention groups may exist; the intervention groups were determined solely by the EMR documentation. Some patients may have received a form of intervention but were misclassified as no intervention if such intervention was not documented properly in the EMR. This may explain the higher CMM completion rate in the no intervention group compared to the letter intervention group, as it's less traceable in the EMR than blocks and EMR-linked messages. There may be potential unmeasured selection bias in the EMR-linked message group as having an activated EMR-linked patient account may pose a sample selection bias as they may be more engaged in their healthcare compared to those that do not have it activated. Additionally, preferences in intervention choices between EMR-linked message and letter may differ among pharmacists. The overall percent of activated EMR-linked patient account, account utilization levels (e.g. recent log-in time), and patient characteristics among those with activated EMR-linked messages were not measured and remain unknown in the study population as those were beyond the scope of this project. There may be additional limitations by varying levels of compliance to the intervention protocol by pharmacists and practice settings.

Although patient characteristics were not measured in this study, the cohort eligibility was through a standardized referral process within the healthcare system. The study objective was to examine the effects of pharmacist's intervention on CMM completion rates, and the findings show rather clear

differences, especially with more personalized reminder approaches such as blocking time, EMR-linked message, and following up via phone. Therefore, this study provides relevant new information to guide further considerations for protocol development and future study directions, such as cost effectiveness analysis from the healthcare system's perspectives in operational costs including pharmacist's productivity, CMM completion rates, and patient outcomes.

### Conclusion

This study provides supportive evidence that pharmacist's intervention is associated with higher CMM completion in patients who have not scheduled their CMM referral visit or did not show up to their scheduled CMM visit. In the newly referred patient cohort, CMM completion rates were higher with pharmacist's direct reminder to the patient when in clinic and EMR-linked message, when compared to mailing a reminder letter or no intervention; both direct in-person reminders and EMR-linked messages were similar. In the no-show patient cohort, a pharmacist's call to patients had higher CMM completion rates compared to mailing a reminder letter.

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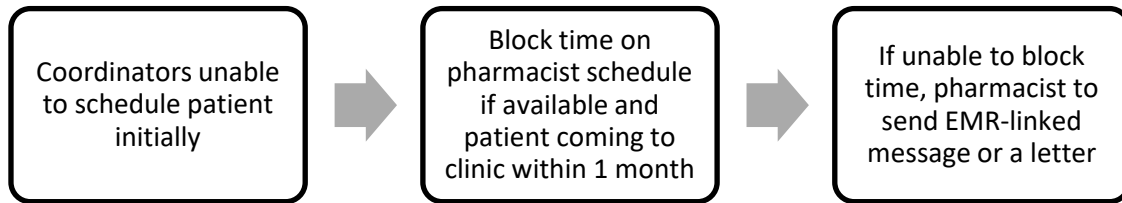
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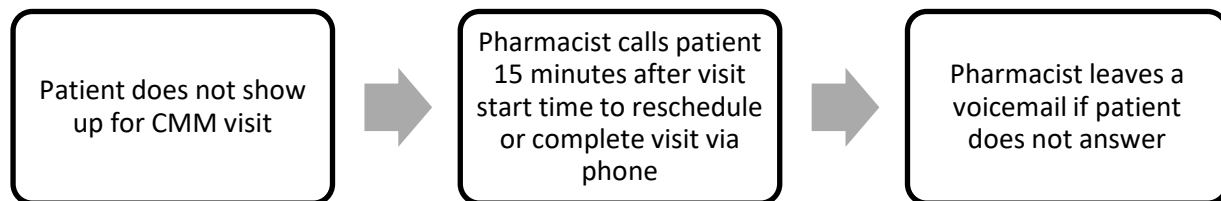
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Figure 1a. Newly Referred Patients Cohort Protocol



Comparison Groups	
Interventions	Block time EMR-linked message Letter
Control	No intervention

Figure 1b. No-Show Cohort Protocol



Comparison Groups	
Intervention	Pharmacist phone call - Reached - Not Reached
Control	Letter

**Table 1. CMM completion by intervention**

Intervention Type	CMM completion	
	Yes	No
Block (n=15)	6 (40.0%)	9 (60.0%)
EMR-linked message (n=20)	8 (40.0%)	12 (60.0%)
Letter (n=60)	7 (10.2%)	53 (89.8%)
No intervention (n=76)	14 (18.4%)	62 (81.6%)

**Table 2. Pairwise comparisons between interventions in CMM completion rates in cohort 1**

	Odds Ratio	95% CI
Block vs EMR-linked message	1.00	0.26 - 3.92
Block vs Letter	6.00	1.58 - 22.70
Block vs No intervention	2.95	0.90 - 9.65
EMR-linked message vs Letter	6.00	1.76 - 20.52
EMR-linked message vs No intervention	2.95	1.02 - 8.57
Letter vs No intervention	0.49	0.18 - 1.37

**Table 3. Predicted probabilities for CMM completion by intervention status in cohort 2**

	Predicted probability	95% CI	
Call- Reached (n=57)	0.63	0.50	0.74
Call- Not Reached (n=95)	0.39	0.21	0.49
Letter (n=71)	0.28	0.19	0.40

**Table 4. Predicted probabilities for CMM reschedule by intervention status in cohort 2**

	Predicted probability	95% CI	
Call- Reached (n=57)	0.88	0.76	0.94
Call- Not Reached (n=95)	0.42	0.33	0.52
Letter (n=71)	0.41	0.30	0.53