Pharmacist and physician collaborative prescribing

For medication renewals within a primary health centre

Angela McKinnon ACPR **Derek Jorgenson** PharmD

ABSTRACT

OBJECTIVE To determine if there is improvement in medication management when pharmacists and family physicians collaborate to prescribe medication renewals requested by fax.

DESIGN Prospective, non-randomized controlled trial.

SETTING West Winds Primary Health Centre, an interdisciplinary health centre that includes an academic family medicine practice, located in Saskatoon, Sask.

PARTICIPANTS All patients whose pharmacies faxed the health centre requesting prescription renewals between October 2007 and February 2008 were selected to participate in the study.

INTERVENTIONS Medication renewal requests were forwarded to the pharmacist (who works in the clinic part-time) on days when he was working (intervention group). The pharmacist assessed drug-therapy issues that might preclude safe and effective prescribing of the medication. The pharmacist and physician then made a collaborative decision to authorize the requested medication or to request additional interventions first (eg, perform laboratory tests). When the pharmacist was not working, the physicians managed the renewal requests independently (control group).

MAIN OUTCOME MEASURES Medication renewals authorized with no recommendations, medication-related problems identified, new monitoring tests ordered, and new appointments scheduled with health providers.

RESULTS A total of 181 renewal requests were included (94 in the control group and 87 in the intervention group). The control group had significantly more requests authorized with no recommendations (75.5% vs 52.9%, $P=.001$). Those in the intervention group had significantly more medication-related problems identified (26 vs 10, $P=.031$); medication changes made (24 vs 10, $P=.044$); and new appointments scheduled with their family physicians (31 vs 21, $P=.049$).

CONCLUSION There is an improvement in medication management when a pharmacist collaborates with family physicians to prescribe medication renewals. The collaborative model created significantly more activity with each renewal request (ie, identification of medication-related problems, medication changes, and new appointments), which reflects an improvement in the process of care.

EDITOR'S KEY POINTS

- Many patients who take chronic medications have their pharmacists contact their physicians (often by fax) to request ongoing prescriptions, rather than making appointments with their physicians when they need more medication. Unfortunately, physicians must assess the appropriateness of these renewal requests during a busy clinic day and, as a result, a complete assessment of medication appropriateness is not always possible.
- The authors sought to examine whether a collaborative approach to authorizing these faxed renewal requests would improve the process. They found that there was improvement in medication management when a pharmacist collaborated with the physicians to prescribe medication renewals, but that the intervention represented a substantial workflow disruption for the pharmacist.
- Future research might examine ways to improve the efficiency of the intervention or attempt to validate these results in a larger sample using clinical outcomes (eg, reduced adverse drug events) and pharmacists practising in others settings (eg, traditional community pharmacies).

This article has been peer reviewed.
Can Fam Physician 2009;55:e86-91

Collaboration médecins-pharmaciens pour la prescription

Renouvellement de prescriptions dans un centre de soins primaires

Angela McKinnon ACPR **Derek Jorgenson** PharmD

RÉSUMÉ

OBJECTIF Déterminer on si améliore la gestion de la médication quand médecins de famille et pharmaciens collaborent au renouvellement des ordonnances demandées par télécopieur.

TYPE D'ÉTUDE Essai clinique prospectif non randomisé.

CONTEXTE West Winds Primary Health Center, un centre de santé interdisciplinaire de Saskatoon, Saskatchewan, qui comprend une clinique universitaire de médecine familiale.

PARTICIPANTS Ont été sélectionnés tous ceux pour lesquels une pharmacie a télécopié une demande de renouvellement d'ordonnance au centre de santé entre octobre 2007 et février 2008.

INTERVENTIONS Les demandes de renouvellement d'ordonnance ont été adressées au pharmacien (qui travaille à temps partiel dans la clinique) les jours où il travaillait (groupe d'intervention). Le pharmacien évaluait tous les aspects liés à la pharmacothérapie susceptibles de nuire à une prescription sécuritaire et efficaace des médicaments. Le pharmacien et le médecin décidaient alors en collaboration d'autoriser la médication demandée ou d'exiger d'abord une intervention additionnelle (p. ex. un examen de laboratoire). Quand le pharmacien ne travaillait pas, le médecin s'occupait seul de la demande de renouvellement (groupe témoin).

PRINCIPAUX PARAMÉTRES ÉTUDIÉS Renouvellements d'ordonnances autorisés sans recommandation, problèmes liés à la médication identifiés, nouveaux examens de contrôle demandés et nouvelles prises de rendez-vous avec le personnel soignant.

RÉSULTATS On a retenu 181 demandes de renouvellement (94 pour le groupe témoin et 87 pour le groupe d'intervention). Le nombre de demandes autorisées sans recommandation était significativement plus élevé dans le groupe témoin (75,5% vs 52,9%, $P=,001$). Le groupe d'intervention avait un nombre significativement plus grand de problèmes liés à la médication (26 vs 10, $P=,031$); de changement de médication (24 vs 10, $P=,044$); et de nouvelles prises de rendez-vous avec leur médecin de famille (31 vs 21, $P=,049$).

CONCLUSION La gestion de la médication est meilleure quand un pharmacien collabore avec le médecin de famille pour le renouvellement des ordonnances. Ce type de collaboration a suscité une augmentation significative des interventions pour chaque demande de renouvellement (i.e. détection des problèmes liés à la médication, changements de médicament, nouveaux rendez-vous), ce qui donne à croire à une amélioration du processus de soins.

POINTS DE REPÈRE DU RÉDACTEUR

- Lorsque leur ordonnance pour le traitement d'une maladie chronique vient à échéance, plusieurs patients, plutôt que de prendre rendez-vous avec leur médecin, demandent au pharmacien de télécopier une demande de renouvellement à leur médecin. Malheureusement, le médecin doit évaluer la justification de cette demande de renouvellement durant une journée de consultation fort achalandée, de sorte qu'une évaluation adéquate n'est pas toujours possible.
- Les auteurs voulaient déterminer si le processus d'autorisation par télécopieur de ces renouvellements pourrait être amélioré par une collaboration médecin-pharmacien. Ils ont trouvé que cette collaboration améliorait la gestion du renouvellement de la médication, mais que cela interférait considérablement avec le travail courant du pharmacien.
- D'autres études pourraient examiner des façons d'améliorer l'efficacité de cette intervention ou tenter de valider les présents résultats avec un échantillon plus grand, en utilisant des issues cliniques (p. ex. réduction des effets indésirables) et avec des pharmaciens exerçant dans d'autres contextes (p. ex. des pharmacies communautaires classiques).

Cet article a fait l'objet d'une révision par des pairs.
Can Fam Physician 2009;55:e86-91

The Canadian primary health system is struggling to provide safe and effective medication management. One recent Canadian study found that 25% of general hospital admissions were drug-related, and more than 70% of these admissions were preventable.[1] Two other Canadian studies found that 17% of patients discharged from hospital experienced a medication-related adverse event soon after discharge,[2] and 8% of emergency department visits were caused by preventable adverse drug events.[3] Similarly, there is evidence suggesting that substantial improvements can be made in medication management for chronic diseases, such as asthma,[4] cardiovascular disease,[5] and diabetes,[6] in Canada.

Solving these medication challenges will be complex and multifactorial. However, one area that might benefit from targeted improvement efforts is the renewal process for chronic medications in family physician practices. In the Canadian health system, patients who take chronic medications do not always make appointments with their physicians when they need more medication. Many patients have their pharmacists contact their physicians (often by fax) to request ongoing prescriptions, and many physicians authorize these requests if the patients are stable, if they have appointments scheduled in the near future, or if they were recently seen in the clinic. Unfortunately, physicians must assess the appropriateness of these faxed renewal requests during a busy clinic day, when it might be challenging to identify problems associated with the renewal requests. As a result, a complete assessment of medication appropriateness is not always possible. A collaborative approach to authorizing these faxed renewal requests might improve the process and avoid unnecessary appointments. Pharmacists not only have the expertise to assist in this task, but they have an existing working relationship with physicians that will foster teamwork and collaboration. In addition, many jurisdictions in Canada are considering expanding pharmacists' prescriptive authority to facilitate their involvement in the medication management process. Therefore, there could be an opportunity for pharmacists and physicians to collaborate to improve the safety and effectiveness of the medication renewal process.

Many studies have shown that pharmacist-physician collaboration on primary health care teams can improve medication management.[7-12] One such collaborative model that is gaining popularity in Canada because of its proven value is the integration of pharmacists within primary health teams.[13,14] In this model, pharmacists practise as co-located members of primary health teams or family physician practices (with no dispensing role), acting primarily as clinical consultants and educators. Pharmacists practising in this model would be in a perfect position to assist with medication renewals, owing to their physical presence in the family physician office. Unfortunately, we did not identify any studies to support the hypothesis that collaboration between integrated primary health team pharmacists and family physicians might improve the medication renewal process. There are studies that evaluate the effects of independent pharmacist-managed prescription renewal clinics in the United States, where pharmacists work independently to authorize prescription renewals instead of physicians.[15-17] Although these studies demonstrate that these renewal clinics provide a valuable service, the health system is clearly moving away from independent models of practice owing to the resounding overall benefits of collaborative practice.

The purpose of this study was to determine if there was improvement in medication management when a pharmacist collaborated with family physicians to prescribe medication renewals requested by fax.

METHODS

This prospective, non-randomized controlled trial was conducted at West Winds Primary Health Centre (WWPHC) in Saskatoon, Sask, from October 2007 to February 2008. To reduce the risk that physicians would change their usual practice as a result of knowing they were being evaluated, we planned to run the study erratically for 10 weeks of the 20-week study period. The study was approved by the University of Saskatchewan Biomedical Research Ethics Board.

West Winds Primary Health Centre is an interdisciplinary primary health centre that houses a large variety of health professionals and primary health services, including an academic family medicine practice and a part-time integrated primary health team pharmacist. Patients were recruited from the family medicine practice at WWPHC. All patients whose pharmacies faxed WWPHC requesting a renewal of a prescription medication during the study period were selected to participate in the study. Renewal requests that were made for patients who had left the family medicine practice at WWPHC were excluded.

Eligible patients were enrolled into either the intervention or the control group based on the availability of the part-time pharmacist who was part of the intervention group. If the renewal request was received when the pharmacist was working, the patient was enrolled in the intervention group and the request was directed to the pharmacist. The pharmacist reviewed the chart to assess the appropriateness of authorizing the prescription by determining if the requested medications appeared to be having the desired therapeutic effect and if patients were being appropriately monitored. After discussing the assessment with the physician, a decision was made collaboratively to prescribe or deny the medication with or without additional intervention. If

the renewal request was received when the pharmacist was not working, the patient was enrolled in the control group and the request was directed to the physician (usual care) who independently made the decision to prescribe or deny the medication.

Primary end points were renewal requests authorized with no recommendations or interventions; medication-related problems identified and resulting medication changes made; monitoring tests ordered; and new appointments scheduled. Medication-related problems were classified by type and severity. Severity ratings were assigned independently by the study pharmacist using the following criteria: high—potentially life-threatening; moderate—potentially harmful or clinically observable negative effect; low—not ideal but not likely harmful. End points were assessed using a chart review that was performed at least 30 days after the renewal request was received.

The χ^2 test was used to compare sex between the groups, and the independent *t* test was used to compare all other data. A significance value of $P<.05$ was used for all analyses.

RESULTS

A total of 190 prescription renewal requests were received during the study period. After completing the chart reviews, 9 of the renewal requests (all in the control group) had no chart documentation regarding the request. It was assumed that this was the result of faxes being received for other purposes (eg, insurance forms), which were erroneously included in the study. These 9 requests were excluded and 181 were included in the final analysis (94 in the control group and 87 in the intervention group). Groups were similar at baseline except that the control group had more male patients (**Table 1**).

In both groups combined, there were 117 (64.6%) prescriptions renewed without interventions or recommendations. Most of these patients had either recently attended appointments or had appointments scheduled in the near future. Significantly more patients in the control group had renewals authorized without intervention (75.5% vs 52.9%, $P=.001$), suggesting that the intervention group had more activity generated as a result of the renewal requests. Compared with controls, the intervention group had significantly more medication-related problems identified (26 vs 10, $P=.031$), which resulted in significantly more medication changes being made (24 vs 10, $P=.044$). In addition, intervention patients were recalled for physician appointments more often (31 vs 21, $P=.049$) and there was a non-significant trend toward more appointments being booked with the clinic pharmacist, more monitoring tests being ordered, and more referrals being made to other health care professionals (**Table 2**).

Table 1. Baseline patient characteristics

CHARACTERISTICS	INTERVENTION GROUP (N = 87)	CONTROL GROUP (N = 94)	*P* VALUE
Age, y	58.4	57.7	> .05
Male, %	29.9	47.9	.013
Mean no. of medications	7.9	7.6	> .05
Time since last appointment, d	96.7	101.9	> .05
Time since last laboratory results, d	166.1	157.7	> .05

Table 2. Comparison of rates of interventions

END POINTS	INTERVENTION GROUP (N = 87)	CONTROL GROUP (N = 94)	*P* VALUE
No. of requests approved with no intervention	46	71	.001
No. of DRPs	26	10	.031
No. of medication changes	24	10	.044
No. of new appointments with physician	31	21	.049
No. of new referrals to pharmacist	7	2	.068
No. of monitoring tests ordered	10	7	.354
No. of referrals to other HCPs	3	0	.070

DRP—drug-related problems, HCP—health care provider.

The most common medication-related problems identified in both groups were "additional drug needed," "low dose," and "no indication." "Wrong drug" and "high dose" were found more often in the intervention group; otherwise, the distribution of the medication-related problems was similar in both groups. All medication-related problems were rated as being of low (n = 15) or moderate (n = 21) severity. The following 2 examples illustrate the medication-related problems found. In one case, a patient was taking 2 β-blockers, one prescribed by the family physician and the other prescribed by a nephrologist. The patient had refilled both β-blockers numerous times. As a result of the renewal request, one of the medications was discontinued and the dose of the other was increased. In another case, a renewal request prompted the pharmacist to telephone the patient. During the call, the pharmacist determined that the patient was having probable statin-induced myalgia. The statin was discontinued. Laboratory tests were ordered, a new appointment with the family physician was booked, and a referral was made to the pharmacist.

Additional descriptive data were collected to further characterize the activity that occurred as a result of the

renewal requests (**Table 3** and **Box 1**[18]). The pharmacist spent an average of 10 minutes on each renewal request in the intervention group (range 5 to 25 minutes).

Table 3. Descriptive data for the intervention and control groups combined

ACTIVITY	DATA
Average no. of requests/wk (range)	27 (19-35)
Average length of request approval, d	93.8
No. of requests denied	16
Pharmacist workload, average min/ renewal request (range)	10.1 (5.0-25.0)

Box 1. Most-requested medications: *Medications were grouped according to the* AHFS Drug Information *classification.*[18]

Most-requested medications:

1. β-blockers
2. ACE inhibitors
3. Statins
4. Narcotics
5. Furosemide
6. Miscellaneous medications
7. ASA
8. Warfarin
9. ARBs
10. PPIs

ACE—angiotensin-converting enzyme, ARB—angiotensin receptor blocker, ASA—acetylsalicylic acid, PPI—proton pump inhibitor.

DISCUSSION

The results of this study suggest that there is improvement in medication management when a pharmacist integrated in a primary health centre collaborates with family physicians to prescribe medication renewals. The collaborative model tested, which included having a pharmacist screen all faxed renewal requests before discussing them with the physician, resulted in more medication-related problems being identified, more medication changes being made, and more follow-up appointments being scheduled with the physician. These process measures of care represent the "activity" that was created by the collaborative model. This activity reflects the ability of this collaborative model to overcome *clinical inertia,* which is a term used to describe the failure of health providers to initiate, intensify, or adjust chronic therapies.[19] The ability of this intervention to overcome clinical inertia is further supported by the fact that there were significantly fewer prescription renewal requests approved with no intervention in the collaborative model compared with usual care (52.9% vs 75.5%, $P=.001$) and that the 3 most common medication changes were to stop a drug, start a drug, or change a dose. Therefore, we believe these results represent improvement in medication management. Considering 58% of the medication-related problems identified were of moderate severity (ie, might lead to a potentially harmful or clinically observable negative effect), this improvement is also clinically important.

The results of this study also suggest that most faxed renewal requests are coming from patients who are receiving excellent follow-up and monitoring, who might have been wasting the physician's time had they made appointments simply to renew their prescriptions. This is based on the finding that a large number of prescription renewal requests were approved with no intervention deemed necessary (64.6% overall). Even when the pharmacist collaborated with the physician, more than 50% of the prescriptions were renewed without any intervention. Common reasons for these requests to be approved without intervention included the following: the patient had recently attended a follow-up appointment, the patient had a follow-up appointment booked, and it was deemed that no follow-up was necessary. These data highlight how difficult it can be, during regular clinic visits, for physicians to order multiple medications in a way that ensures they all run out at the same time, just before the next scheduled appointment. Medication doses can change between appointments based on laboratory test results, clinical response, or patient adherence, resulting in prescriptions running out at unexpected times. Therefore, despite the trend for some Canadian family physicians to restrict or refuse faxed prescription renewal requests, our results support an ongoing role for faxed prescription renewal requests in family medicine practices. However, these faxed requests are best managed using a collaborative model.

A considerable barrier to the practicality of this collaborative model was the effect on pharmacist workload. The pharmacist spent an average of 10 minutes on each of the 27 weekly faxed renewal requests received at the health centre, which worked out to approximately 4.5 hours of work per week. It is likely that some of this time was spent becoming familiar with the patients, and, although this extra workload might ultimately prove to be worthwhile, the erratic nature in which the requests were received made this intervention a considerable workflow disruption for the pharmacist. There might be an opportunity to improve the efficiency of this collaborative model and its effect on pharmacist workload by allowing the pharmacist some degree of delegated or prescriptive authority. Considering that more than half of the requests were for patients who either recently attended physician appointments or who were scheduled to do so in the very near future, it was a mere formality for the pharmacist to find the physician to authorize some of the prescriptions. If the pharmacist were able to

independently authorize prescriptions in these scenarios and discuss with the physician only the cases that required intervention, this process would be more efficient for both the pharmacist and the physicians.

Limitations

We used surrogate end points to measure improvement in medication management. Future studies using clinical outcome measures (eg, adverse drug reactions) will help support the benefit of this intervention. The short follow-up period represents a further limitation of this study. Chart reviews were performed approximately 30 days after the renewal request was received, which might not have been adequate to capture all of the activity that resulted.

Conclusion

There is improvement in medication management when a pharmacist collaborates with physicians to prescribe medication renewals. Future research might attempt to validate these results in a larger sample using clinical outcomes (eg, reduced adverse drug events) and pharmacists practising in others settings (eg, traditional community pharmacies).

Ms McKinnon is a clinical pharmacist with the Chronic Kidney Disease Clinic at St Paul's Hospital in Saskatoon, Sask. **Dr Jorgenson** is an Assistant Professor with the College of Pharmacy and Nutrition at the University of Saskatchewan and a clinical pharmacist at West Winds Primary Health Centre in Saskatoon.

Contributors

Both authors directly contributed to the planning, execution, and analysis of the study and approved the final submission for publication.

Competing interests

None declared

Correspondence

Ms Angela McKinnon, St Paul's Hospital, Chronic Kidney Disease Clinic, 1702-20th St W, Saskatoon, SK S7M 0Z9; telephone 306 655-5407; fax 306 655-5690; e-mail **angela.mckinnon@saskatoonhealthregion.ca**

References

1. Samoy LJ, Zed PJ, Wilbur K, Balen RM, Abu-Laban RB, Roberts M. Drug-related hospitalizations in a tertiary care internal medicine service of a Canadian hospital: a prospective study. *Pharmacotherapy* 2006;26(11):1578-86.
2. Forster AJ, Clark HD, Menard A, Dupuis N, Chernish R, Chandok N, et al. Adverse events among medical patients after discharge from hospital. *CMAJ* 2004;170(3):345-9. Erratum in: *CMAJ* 2004;170(5):771.
3. Zed PJ, Abu-Laban RB, Balen RM, Lowen PS, Holh CM, Brubacher JR, et al. Incidence, severity and preventability of medication-related visits to the emergency department: a prospective study. *CMAJ* 2008;178(12):1563-9.
4. Clomp H, Chan BTB, Jorgenson D, Cascagnette P, Gander L. *Breathing easier—opportunities to improve the quality of asthma care in Saskatchewan.* Saskatoon, SK: Health Quality Council; 2005.
5. Chan BTB, Brossart BD, Hudema NRL, Stevenson K, Walling E, Basky G, et al. *Improving the quality of heart attack care in Saskatchewan: outcomes and secondary prevention.* Saskatoon, SK: Health Quality Council; 2004.
6. Chan BTB, Clomp H, Cascagnette P. *Quality of diabetes management in Saskatchewan.* Saskatoon, SK: Health Quality Council; 2006.
7. Farris KB, Côté I, Feeny D, Johnson JA, Tsuyuki RT, Brilliant S, et al. Enhancing primary care for complex patients. Demonstration project using multidisciplinary teams. *Can Fam Physician* 2004;50:998-1003.
8. Telner A, Gervais A, Amos S. Outcomes of a multidisciplinary approach to the management of metabolic syndrome. *Can Pharm J* 2008;141(1):42-7.
9. March K, Mak M, Louie SG. Effects of pharmacists' interventions on patient outcomes in an HIV primary care clinic. *Am J Health Syst Pharm* 2007;64(24):2574-8.
10. Adler DA, Bungay KM, Wilson IB, Pei Y, Supran S, Peckham E, et al. The impact of a pharmacist intervention on 6-month outcomes in depressed primary care patients. *Gen Hosp Psychiatry* 2004;26(3):199-209.
11. Choe HM, Mitrovich S, Dubay D, Hayward RA, Krein SL, Vijan S. Proactive case management of high-risk patients with type 2 diabetes mellitus by a clinical pharmacist: a randomized controlled trial. *Am J Manag Care* 2005;11(4):253-60.
12. Sookaneknun P, Richards RM, Sanguansermsri J, Teerasut C. Pharmacist involvement in primary care improves hypertensive patient clinical outcomes. *Ann Pharmacother* 2004;38(12):2023-8.
13. Dolovich L, Kaczorowski J, Howard M, Rodriguez MC, Gaebel K, Haq M, et al. Cardiovascular outcomes of a pharmaceutical care program integrated into family practices. *Can J Clin Pharmacol* 2007;14(2):e116.
14. Dolovich L, Kaczorowski J, Sellors C, Farrell B, Rodriguez MC, Gaebel K, et al. Integration of a pharmaceutical care program into family practices: drug-therapy problems identified and recommendations made by participating pharmacists. *Can J Clin Pharmacol* 2007;14(2):e164.
15. D'Achille KM, Swanson LN, Hill WT. Pharmacist-managed patient assessment and medication renewal clinic. *Am J Hosp Pharm* 1978;35(1):66-70.
16. McCloskey BA. Experience with a pharmacy renewal clinic. *Hosp Pharm* 1996;31(10):1272-4.
17. Cassidy IB, Keith MR, Coffey EL, Noyes MA. Impact of pharmacist-operated general medicine chronic care renewal clinics on practitioner time and quality of care. *Ann Pharmacother* 1996;30(7-8):745-51.
18. McEvoy GK, editor. *AHFS drug information (2009).* Bethesda, MD: American Society of Health-System Pharmacists, Inc; 2009.
19. Phillips LS, Branch WT, Cook CB, Doyle JP, El-Kebbi IM, Gallina DL, et al. Clinical inertia. *Ann Intern Med* 2001;135(9):825-34.