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This article looked at an expanded role for a pharmacist at a time when there was a shortage of physicians. It looked at cost savings and patient benefit. We used a pharmacist to allow more patients to have access to the physicians.

Le présent article se penche sur l'élargissement du rôle de pharmacien à une époque où il y a une pénurie de médecins. Il examine les économies de coûts et les bienfaits pour le patient. Nous utilisons un pharmacien pour permettre à un plus grand nombre de patients d'avoir accès à un médecin.

Medication management of chronic pain: A comparison of 2 care delivery models

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ABSTRACT

Background: The prevalence of chronic pain is high and increasing. Medication management is an important component of chronic pain management. There is a shortage of physicians who are available and comfortable providing this service. In Alberta, pharmacists have been granted an advanced scope of practice. Given this empowerment, their availability, training and skill set, pharmacists are well positioned to play an expanded role in the medication management of chronic pain sufferers.

Objective: To compare the effectiveness and cost of a physician-only vs a pharmacist-physician team model of medication management for chronic nonmalignant pain sufferers.

Method: Data was analyzed for 89 patients who had received exclusively medication management at a rural Alberta multidisciplinary clinic. 56 were managed by a sole physician. 33 were managed by a team (pharmacist + physician). In the team model, the physician did the medical

assessment, diagnosis, and established a treatment plan in consultation with the patient and pharmacist. The pharmacist then provided the ongoing follow-up including education, dose titration and side effect management and consulted with the physician as needed. Change in pain (Numerical Rating Scale) and disability (Pain Interference Questionnaire) over the course of treatment were recorded. The treatment duration and number of visits were used to calculate cost of care.

Results: Both models of medication management resulted in significant and comparable improvements in pain, disability and patient perception of medication effectiveness. Patients in the physician-only group were seen more frequently and at a greater cost. The pharmacist-physician team approach was markedly more cost-effective, and patients expressed a high level of satisfaction with their medication management.

Conclusions: The pharmacist-physician team model of medication management results in significant reductions of pain and disability for chronic nonmalignant pain sufferers at a reduced cost and is well accepted by patients. *Can Pharm J (Ott)* 2017;150:112-117.

MEDICATION MANAGEMENT IS AN INTEGRAL component of the treatment of chronic pain. This includes appropriate medication selection, dosage, titration schedule, side effect management and ongoing follow-up. In Alberta, it is estimated that approximately 11% of residents have

chronic pain, and approximately one-quarter of them classify their pain as severe.¹ In addition, the prevalence of chronic pain is increasing as the population ages.² There are inadequate numbers of physicians in Alberta, and only a portion of them are comfortable and skilled at managing

chronic pain. Recently, Alberta pharmacists were granted expanded counselling and prescribing privileges.³ Not only are pharmacists more available, but the health care system costs for their services are less per hour than those of physicians.

The Central Alberta Pain and Rehabilitation Institute (CAPRI) is a small interdisciplinary chronic pain management program in rural Alberta.⁴ Services available through CAPRI include medication management, minimally invasive interventional procedures, exercise, education and psychology. After comprehensive assessment, a treatment plan is developed and the services required to achieve the desired outcome are prescribed. In a subset of patients, medication management/optimization alone is deemed to be the best approach. During the first 2 years of its operation, medication management services were provided solely by a primary care physician who worked full-time with the program. This physician provided the full spectrum of medication management services, including assessment, diagnosis, establishment of the medication management plan, dosage titration/optimization, side effect management and drug rotation. Thereafter, the medication management care delivery model changed. Physician services were provided by specialists (anesthesiologist, neurologist and physiatrist) and were consultative and less frequent. A pharmacist was recruited to the team and participated in the initial patient assessment and team conference, at which time the medication management treatment plan was established. The pharmacist then provided the ongoing patient follow-up including drug education, dose titration and side effect management, with periodic consultation with the physician. This care model continued for 3 years. Over that 5-year continuum, the same intake data and follow-up outcome measures were prospectively gathered, allowing the opportunity to compare the effectiveness of the 2 different models.

The objective of this study was to compare the effectiveness and cost of a physician-only vs a pharmacist-physician team model of medication management for chronic nonmalignant pain sufferers.

Methods

Data from 56 patients treated by the physician-only model (MD) and 33 patients treated by the

KNOWLEDGE INTO PRACTICE

- Both models resulted in comparable improvements in pain and disability.
- The pharmacist + physician team model was more cost-effective. The average cost per patient was \$93.10 compared with \$1192 in the physician-only model.
- Patients expressed a high level of satisfaction with the team model of care.

pharmacist-physician team model (Pharm-MD) were retrospectively reviewed and compared. These data had been prospectively gathered for both groups. Upon initial assessment, all patients completed the same intake questionnaire, which included personal demographics; general medical history; pain history and description; prior and current treatments, including medications; and a Pain Interference Questionnaire. Patients then underwent a comprehensive medical evaluation performed by the physician. A diagnosis was made, and the type of pain was classified. For the patients in this study's cohort, it was deemed that the treatment approach most likely to be beneficial was exclusively medication management and that it would be best optimized through CAPRI. Once it was felt that medication management had been optimized, the patient was discharged back to the care of the referring physician. If patients were using other treatment modalities such as exercise, chiropractic, massage, and so forth, they were asked to maintain their usual schedule for these treatments and not embark on anything new other than the medication management they were receiving through CAPRI.

As previously mentioned, for the MD model, all facets of medication management were performed by the primary care physician. Follow-up care, including dose adjustments and side effect management, was exclusively by way of clinic visit. At most follow-up visits, a Brief Pain Inventory Questionnaire and a Pain Interference Questionnaire (PIQ; see Appendix 1, available in the online version of the article) were completed. The PIQ is a commonly used and well-validated questionnaire quantifying the magnitude of pain-related interference in 7 different life domains and is considered an estimate of disability.⁵

MISE EN PRATIQUE DES CONNAISSANCES

- Les deux modèles apportent une amélioration comparable sur le plan de la douleur et de l'invalidité.
- Le modèle de partenariat médecin-pharmacien est plus rentable que l'autre modèle étudié. Le coût moyen par patient est de 93,10 \$ comparativement à 1 192 \$, avec le modèle où le médecin travaille de façon isolée.
- Les patients ont exprimé un degré élevé de satisfaction par rapport au modèle de soins en collaboration.

For the Pharm-MD model, the pharmacist prepared a past and current medication profile that was reviewed by the specialist (anesthetist, neurologist or physiatrist) prior to the initial assessment. At the completion of the specialist assessment, the patient was introduced to the CAPRI pharmacist. The physician, pharmacist and patient established the medication management plan. Implementation of that plan was delegated to the pharmacist and was conducted either personally or by telephone. Information was obtained and recorded on a Medication Management Plan and Patient Encounter Record (see Appendix 2, available in the online version of the article) that included the Brief Pain Inventory Questionnaire scores. Patients also answered a question regarding their satisfaction with the way their medications were being managed. Team conferences between the pharmacist and physician occurred intermittently as required, particularly if progress was unsatisfactory, intractable adverse effects developed or a new medical event occurred. The patient was discharged from CAPRI medication management when it was deemed that management was optimized or had failed. The number of patient contacts (visits or calls) and, for the pharmacist, the duration of the contact were recorded.

Government health care insurance cost of care was calculated for the MD group by adding up the Alberta Health and Wellness billings of the primary care physician, excluding the initial assessment and all follow-up visits. The cost of care for the Pharm-MD model was calculated as the sum of the Alberta Health and Wellness Billings except for the initial specialist visit and subsequent visit/team conferences with the pharmacist. Pharmacist time for the initial patient visit was counted as well as subsequent

visit/team conferences with the specialists and time spent interacting with patients, at a value of \$50.00 per hour. Cost-effectiveness was calculated as total cost divided by the improvement in pain (initial minus discharge numbers) and disability (initial minus discharge PIQ). The outcome variables of interest (pain intensity, disability, percentage relief with medication, cost of care and cost-effectiveness [total cost/improvement]) were analyzed using an analysis of variance statistical model. For the cost-effectiveness (total cost/improvement) calculation, if there was a negative net or nonimprovement, a value of 1 was assigned to allow these cases to be included in the analysis.

Results

Table 1 summarizes patient demographics. Gender, age and initial pain intensity were comparable for the 2 groups. The MD group had suffered with chronic pain significantly longer than the Pharm-MD group, and they tended to have higher average pain intensities. The MD group also perceived themselves as significantly more disabled. Prior to treatment, the MD group were experiencing a greater percentage of pain relief from their existing medication management regimen than the Pharm-MD group.

Table 2 summarizes treatment effectiveness. These data suggest that medication management, whether administered through the MD or Pharm-MD model, resulted in significant reduction of pain intensity and disability and that one model was not superior to the other. Both medication management models resulted in comparable patient perceptions that their medications relieved significantly more of their pain.

Table 3 summarizes treatment cost and cost-effectiveness. These data suggest significant differences in practice pattern, treatment cost and cost-effectiveness. Specifically, although the Pharm-MD model completed medication management within approximately the same time frame (~7 to 8 months), the primary care physician reviewed the patient approximately twice as often. That, in addition to the higher cost for physician services, resulted in a marked difference in overall cost and cost-effectiveness between the 2 models. The Pharm-MD model was approximately 13 times less expensive and 13 and 19 times more cost-effective in achieving reductions of pain and disability, respectively.

TABLE 1 Baseline patient demographics, mean (SD)*

	MD (n = 56)	Pharm-MD (n = 33)	F ratio	p value
Female (%)	67	63		
Age (y)	48.6 (14.6)	51.2 (14.2)	.71	0.4
Duration of pain (y)	9.6 (12.2)	4.3 (3.5)	5.8	0.02
Initial average pain intensity (NRS)	6.7 (2.2)	5.8 (2.2)	3.8	0.06
Initial Pain Interference Questionnaire score	48 (14.9)	38 (11.2)	11.9	0.0008
Relief from pain medication (%)	39 (28)	24 (19)	8.6	0.006

NRS = 0-10 Numerical Rating Scale.

*One-way analysis of variance.

TABLE 2 Medication management effectiveness*

	MD	Pharm-MD	F ratio			p value		
			Within group	Between group	Inter-action	Within group	Between group	Inter-action
Pain intensity (NRS, mean [SD])								
Before treatment	6.7 (2.2)	5.8 (2.2)	49.0	2.8		0.00001	0.1	
After treatment	4.5 (2.2)	4.1 (2.4)						
% Improvement	33	29			0.87			0.35
Disability (PIQ)								
Before treatment	48.0 (14.9)	37.6 (11.2)	64.7	12.6		0.0001	0.0006	
After treatment	33.9 (17.6)	23.8 (15.4)						
% Improvement	29	37			0.008			0.91
Relief from pain medication (%)								
Before treatment	39 (28)	24 (19)	29.8	6.6		0.00001	0.01	
After treatment	54 (29)	45 (28)						
% Improvement	38	88			0.9			0.35

NRS = Numerical Rating Scale; PIQ = Pain Intensity Questionnaire.

*Two-way (treatment model × time) analysis of variance with repeated measures on the time factor.

At discharge, the Pharm-MD group was asked, “How satisfied are you with the way your pain control medications are being managed?” (0 = *not satisfied at all*; 10 = *completely satisfied*). The mean (SD) response was 9.5 (1.1), indicating a high level of satisfaction with the Pharm-MD pain management medication model.

Discussion

In a health care environment characterized by expanding need for medication management

services for patients with chronic nonmalignant pain, limited financial resources and an inadequate number of physician service providers, identifying the most effective and efficient service delivery model is vital. The objective of this study was to compare the effectiveness and cost of a physician-only vs a pharmacist-physician team model of medication management for chronic nonmalignant pain sufferers. We found that while both the MD and Pharm-MD team models result in significant and comparable

TABLE 3 Treatment cost and cost-effectiveness,* mean (SD)

	MD	Pharm-MD	F ratio	p value
Number of visits	13.9 (9.7)	6.8 (3.5)	16.4	0.0001
Treatment duration in months	8.3 (4.3)	7.1 (4.4)	1.8	0.19
Treatment cost in dollars	1711.06 (1607.82)	133.43 (101.49)	31.5	0.00001
Cost effectiveness				
Pain (cost/reduction of NRS)	1192 (1488.05)	93.1 (88.60)	17.9	0.00006
Disability (cost/reduction of PIQ)	635 (1305.5)	33.5 (47.14)	7	0.01

NRS = Numerical Rating Scale; PIQ = Pain Intensity Questionnaire.

*One-way analysis of variance.

improvements in pain and disability, the Pharm-MD team model was dramatically less expensive and more cost-effective. Importantly, patients were very satisfied with the Pharm-MD team care delivery model. This suggests that the addition of a pharmacist to a chronic pain management team can be expected to benefit patients. Effective physician-directed and pharmacist-implemented pain management services can be offered to an increasing number of patients in the long queues of chronic nonmalignant pain sufferers waiting to see physicians. Our findings also suggest that complementing physician services with those of a pharmacist results in significant cost savings to the health care system and should be considered by health care administrators. Prior research has also documented the Pharm-MD collaborative model of care to be beneficial in other aspects of patient care, including the process of prescription renewal and the treatment of depression and other mental health conditions.⁵⁻⁷

The findings of our study need to be interpreted with caution. Patient allocation was not randomized. In fact, it was dictated by circumstantial changes over time in the operations of the CAPRI program. The physician for the MD model was a primary care physician. For the Pharm-MD model, the physicians were specialists. This could certainly affect practice patterns, including the type of patients referred to CAPRI and those who were chosen to be managed exclusively with medications (selection bias). It could also affect the type of treatment provided in terms of medications used (treatment bias). Bias could also have been introduced as a factor of time as the practice patterns and maturity of the team evolved over the years. The heterogeneity of the 2 groups

is reflected in the demographic differences between them. The patients in the MD group had suffered significantly longer with their chronic pain, were more disabled and had already received medication management that resulted in a higher level of pain control before starting the CAPRI program. It is probable that this group represented a more complex cohort, which may have explained the need for the primary care physician to see them more frequently. This dramatically affected the cost of care. Our cost data were limited to direct cost to Alberta Health and Wellness. Our calculations did not capture indirect costs or cost savings. This is another limitation of the study.

The Pharm-MD model was able to mitigate some of these limitations by offering patients access to the pharmacist who was a link to the specialists. The pharmacist consulted with the specialists and followed up by phoning the patients back in a few days to discuss their concerns. This resulted in a small amount of specialist time required to address patient concerns compared with a clinic visit in the MD model. This patient-pharmacist-specialist link allowed the specialist to affect more patients.

To minimize the risk of selection and treatment bias, future studies should include randomization of subject and, if possible and practical, a control group and standardization of treatment providers.

In summary, within the limitations of the biases inherent in the study, the pharmacist-physician team model of medication management for patients with chronic nonmalignant pain results in significant reductions of pain and disability, is less expensive and is more cost-effective than a physician-only model and is well accepted by patients. ■

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