

Is There a Tension between Clinical Practice and Reimbursement Policy? The Case of Osteoarthritis Prescribing Practices in Ontario

Existe-t-il une tension entre la pratique clinique et les politiques en matière de remboursement?
Le cas des pratiques de prescription pour l'ostéoarthrite en Ontario



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Abstract

Background: Reimbursement policies, such as those used to manage the public drug program for senior citizens in Ontario, focus on providing access to cost-effective drug therapies. These policies may create a dilemma for physicians who want to prescribe a particular drug to a patient, but must factor reimbursement restrictions affecting patient-level access into the prescribing decision.

Methods: Information was collected from 102 physicians about prescriptions given to osteoarthritis patients (n=2,147) aged 65 years or older. Patients' access to prescribed drugs was determined from their insurance coverage and the reimbursement criteria set out in the formulary of the public Ontario Drug Benefit Program (ODBP). Starting from the assumption that physicians would follow published consensus guidelines respecting gastroprotection when prescribing NSAIDs in these at-risk elderly patients, three groups of physicians were identified from the record of their

actual prescriptions. Group A physicians (n=14) prescribed non-selective NSAIDs alone to >60% of their patients. Group B physicians (n=26) prescribed an NSAID + gastroprotective agent or a Cox-2 selective NSAID to >70% of their patients. Group C physicians (n=62) were those that fit into neither category. An open-ended question was included in the study questionnaire to elicit physicians' own interpretation of what impact drug coverage had on their prescribing behaviour.

Results: No significant differences were found across groups with respect to years or type of practice, or to patient characteristics (LR=3.00, $p>.2$). Group C physicians were most likely to change their treatment choice in favour of restricted (limited use) drugs when patients met the criteria for reimbursement or had private insurance and therefore did not have to bear the additional cost out-of-pocket (LR=58.5; $p<.0001$).

Interpretation: Most elderly at-risk patients are prescribed NSAIDs according to the prevailing guidelines. We found, however, that 40% of physicians have prescribing behaviour that favours non-evidence-based (Group A) or evidence-based (Group B) prescribing in this clinical setting irrespective of drug coverage. The remaining 60% of physicians appeared to be more responsive in their prescribing behaviour to financial constraints on patients' access to drugs. They also self-identified as most likely to change treatment if drug coverage had been different. These results have important implications for equity and quality of patient care. They also confirm that physicians' knowledge, values and self-efficacy are key determinants of prescribing behaviour and require further study to better understand how medical education and third-party policies and programs that govern pharmaceutical care are integrated into physicians' decision-making.

Résumé

Généralités : Les politiques en matière de remboursement, comme celles qui sont utilisées dans la gestion du programme de médicaments gratuits pour les personnes âgées de l'Ontario, se concentrent sur l'accès aux thérapies médicamenteuses efficaces. Ces politiques peuvent cependant causer un dilemme aux médecins qui souhaitent prescrire un médicament particulier, mais qui doivent prendre en considération, lors de la décision touchant à la prescription, les restrictions en matière de remboursement applicables au patient.

Méthodes : Des informations ont été collectées auprès de 102 médecins concernant les ordonnances fournies à des patients atteints d'ostéoarthrite (n=2,147) âgés de 65 ans et plus. L'accès aux médicaments prescrits par les patients a été déterminé d'après leur couverture d'assurance et les critères de remboursement précisés au formulaire du Programme de médicaments de l'Ontario (PMO). Partant de l'hypothèse que les médecins se basent sur les lignes directrices publiées fondées sur la preuve concernant la gastroprotection quand ils prescrivent des AINS chez ces patients âgés exposés au risque, on a identifié trois groupes de médecins à partir de la documentation de leurs

ordonnances. Les médecins du groupe A (n=14) ont prescrit des AINS non sélectifs seulement à >60 % de leurs patients. Les médecins du groupe B (n=26) ont prescrit un AINS + un agent gastroprotecteur ou un AINS cox-II sélectif à >70 % de leurs patients. Les médecins du groupe C (n=62) étaient ceux qui ne se plaçaient pas dans ces deux catégories. Une question ouverte a été incluse au questionnaire de l'étude pour éliciter l'interprétation par les médecins eux-mêmes de l'impact de la couverture de l'assurance sur leur comportement de prescription.

Résultats : Aucune différence significative n'a été découverte entre les différents groupes en ce qui concerne les années ou les types de pratique, ou les caractéristiques des patients (LR=3.00, $p>0.2$). Les médecins du groupe C avaient le plus tendance à modifier leur choix de traitement en faveur de médicaments à utilisation limitée ou restreinte quand les patients répondaient aux critères de remboursement ou avaient une assurance privée (LR=58.5; $p<0.0001$).

Interprétation : La plupart des patients âgés à risque reçoivent une ordonnance d'AINS selon les lignes directrices fondées sur la preuve. Nous avons trouvé cependant que 40 % des médecins présentaient un comportement distinct en matière de prescription favorisant la méthode de prescription non fondée sur la preuve (groupe A) ou fondée sur la preuve (groupe B) dans ce milieu clinique, quelle que soit la couverture des médicaments. La majorité restante des médecins ont présenté un comportement variable en matière de prescription pour les deux dimensions de la méthode fondée sur la preuve et de l'accès au niveau des patients. Ils se sont aussi identifiés eux-mêmes comme étant les plus favorables au changement de traitement si la couverture des médicaments était différente. Ces résultats ont des implications importantes quant à l'égalité et la qualité des soins aux patients. Ils confirment aussi le fait que les connaissances, les valeurs et l'efficacité des médecins sont des déterminants clés en matière de comportement relié à la prescription et nécessitent une étude plus approfondie qui permette de mieux comprendre comment l'enseignement médical et les politiques et programmes des tiers qui gouvernent les soins pharmaceutiques sont intégrés au processus de prise de décisions des médecins.

EVIDENCE-BASED MEDICINE (EBM) HAS BEEN DEFINED AS “THE CONSCIENTIOUS, explicit, and judicious use of current best evidence *by physicians* in making decisions about the care of individual patients” (Sackett et al. 1996: 71; italics not in original). It involves the integration of clinical expertise with external evidence from the systematic review of research such as randomized controlled trials (Sackett et al. 1996). Sackett and colleagues considered the practice of EBM by physicians to be the application of the most efficacious treatment regardless of cost (Sackett et al. 1996). However, in most Western economic environments, the cost of

healthcare is rising rapidly (Campbell et al. 2000; Laupacis 2002; Laupacis et al. 2002; MacKinnon and Kumar 2001). These increasing costs are in part associated with the prescription of newer, more costly drugs, as well as increased prescriptions overall (Laupacis et al. 2002; Huttin and Andral 2000; Morgan 2006). In response, third-party payers have introduced a variety of both incentive and disincentive approaches to invoking cost-conscious behaviour in prescribers. Our hypothesis is that cost constraints modify the practice of EBM as proposed by Sackett et al.

One common policy used by public drug insurance programs to control prescribing practices is the drug formulary that explicitly defines which drugs will be reimbursed and under what conditions (MacKinnon and Kumar 2001; Morgan et al. 2003; Tamblyn 2001). Like drug regulatory bodies (Greenhalgh et al. 2004), formulary review committees evaluate data at the level of the whole population, including the cost-effectiveness data that are the primary determinants of listing decisions by the Ontario Drug Benefit Program (ODBP) (Laupacis 2002, 2005). In Ontario, drug listings are categorized as open, limited use (LU) or not listed. An income-based co-payment applies to all ODBP prescriptions, but open-listed drug costs are covered by the government for all plan beneficiaries, while LU drug costs are covered only if the patient meets specific criteria (Laupacis et al. 2002; Laupacis 2005; Morgan 2006; Ontario Ministry of Health and Long-Term Care 2003b). Coverage for drugs that are not listed can be accessed only on a per-patient basis through ODBP approval of individual physician requests.

In Ontario, one mandate of the Ministry of Health is to ensure optimal pharmaceutical services for all senior citizens through the ODBP (Ontario Ministry of Health and Long-Term Care 2003a). All Ontario residents aged 65 years and over who are insured under the *Health Insurance Act* are beneficiaries (Ontario Ministry of Health and Long-Term Care 2003b). Seniors may also have supplementary private health insurance, which can cover a wider range of prescriptions than does the ODBP. The strategic goals of the public program include “ongoing access to cost-effective drug therapies” and the promotion of “optimal drug therapy through the development and use of therapeutic guidelines and other evidence-based approaches” (Ontario Ministry of Health and Long-Term Care 2003a).

Unless patients are willing and able to pay out of pocket, drug formularies can be seen as restricting a physician’s choice of treatment (Freeman et al. 1999; Werner et al. 2002; Wynia et al. 2000). This situation is likely to present a dilemma to physicians who might prefer to practise EBM and who are restricted from doing so by the insurer’s reimbursement policy (Sebaldt et al. 2004). A qualitative exploration of UK physicians’ experience with policies intended to shift financial responsibility for healthcare spending onto general practitioners (GPs) revealed the importance of GPs’ personal belief systems when applying cost considerations to their own prescribing behaviour (Prosser and Walley 2005). Indeed, research has found that some physicians in the

United States will misrepresent facts to insurance companies to gain coverage for their patients for restricted drugs and services (Freeman et al. 1999; Werner et al. 2002; Wynia et al. 2000). This physician behaviour is thought to reflect a conflict between doctors' advocacy for a patient's right to benefit from EBM and their obligations as contractors to a healthcare system with limits (Freeman et al. 1999; Kenny 2006).

However, current research on the behaviour of physicians as a consequence of reimbursement rules often examines hypothetical scenarios or concentrates on service use rather than prescription drug use (Freeman et al. 1999; Werner et al. 2002; Wynia et al. 2000). This study examines the actual prescribing behaviour of general practitioners in Ontario facing potential conflict between EBM recommendations and reimbursement policy in making their choice of drug therapy for patients for whom private and public prescription insurance schemes offer different levels of access. We demonstrate this by using a case study describing the prescribing of non-steroidal anti-inflammatory drugs (NSAIDs).¹ Our analysis of physician behaviour provides insights into the complex decision-making process that underlies prescribing in a general practice setting.

Methods

Data source

The Canadian Osteoarthritis Rx (CANOAR) Program was an observational study that included the collection of information from 119 general practitioners about their prescriptions to successive osteoarthritis (OA) patients (n=5,947) across Ontario over 13 months in 2000/01 (see Sebaldt and Kremer 2003; Sebaldt et al. 2004 for more detailed information). Those invited to participate were drawn from a list of the 1,400 highest NSAID prescribers in Ontario based on the record of their NSAID prescriptions filed in 2000. Information collected from physicians included their years of practice and the type of practice (group or solo); individual prescribing history was not preserved. Overall, 46% of patients for whom data were entered in the CANOAR study were older than 65 years. The current analysis used only data collected on these elderly patients (n=2,147) from 102 of the participating physicians (17 had missing data or saw too few patients). Only those patients for whom drug plan coverage was specified were included. In addition to patient demographics and insurance coverage, the physician provided information on the patient's clinical presentation and history and on the prescription(s) written. In this study, the physician was the unit of analysis, with patient-specific variables providing the basis for categorizing prescribing behaviour.

Independent variables

ELIGIBILITY FOR COVERAGE

Patients were categorized according to their eligibility for the Consensus Guidelines—

recommended gastroprotective agents as either: *restricted access* – patients (n=1,554) who had only ODBP coverage and did not meet the ODBP LU criteria; or, *unrestricted access* – patients (n=593) who met the ODBP LU criteria or had private drug plan coverage. In this study, restricted-access status was almost entirely defined by coxib LU criteria (i.e., have tried acetaminophen and three different NSAIDs, or have had a clinically significant gastro-intestinal [GI] event). As noted above, LU criteria for the PPIs are in line with Consensus Guidelines, but only 40 NSAID+PPI prescriptions were written for this subset of patients in the CANOAR study.

Drug listings, LU criteria and administrative procedures were unchanged throughout the duration of the study. For this analysis we have assumed that all prescriptions submitted to private insurers are reimbursed without restriction.

PHYSICIAN PRESCRIBING TYPES

The association between increasing age over 60 years and morbidity and mortality related to GI complications in non-selective NSAID users is well documented (Gabriel et al. 1991; Blower et al. 1997; Lanus et al. 2005). At the time of the CANOAR data collection, the Second Canadian Consensus Conference had published guidelines for the treatment of osteoarthritis patients with NSAIDs (Tannenbaum et al. 2000). While acknowledging that not all clinical practice guidelines adhere to the most rigorous quality standards (Graham et al. 2001), these Consensus Guidelines are aligned with other contemporary evidence-based recommendations (Rostom and Dube 2003; Lanza 1998; NICE 2007) and might be taken as a relevant benchmark for physicians wanting to practise EBM in Canada at the time of the CANOAR study. These guidelines give special consideration to age as a risk factor for NSAID-related adverse events. In this analysis we define the “elderly at-risk” patient as 65 years and over, in line with other NSAID utilization research (Rahme et al. 2002; Sturkenboom et al. 2003). In addition to an age-related decline in endogenous levels of gastroprotective prostaglandins, elderly patients may also be at high risk secondary to prior GI disease, co-morbidities and concomitant medication use (Gabriel et al. 1991; Lanza 1998). Multiple risks were not assessed in this study.

For patients with risk factors for GI bleeding, the Consensus Guidelines recommend the use of a “Cox-2-specific inhibitor” or “if NSAID use is unavoidable, proton pump inhibitors or misoprostol should be coadministered” (Tannenbaum et al. 2000). The ODBP formulary restricts access to both proton pump inhibitors (PPIs) and Cox-2-specific inhibitors (coxibs) via its LU listing process. LU criteria for PPI prescribing are aligned with the Consensus Guidelines, while the LU criteria for coxib prescribing are not consistent with them. Other EBM guidelines include double-dose histamine 2 receptor antagonists (H2RAs) as another gastroprotection option (Rostom and Dube 2003). H2RAs, misoprostol alone or in combination with diclofenac (Arthrotec®) and

traditional NSAIDs are all open-listed on the ODBP formulary.

Three groups of physicians were created according to the frequency with which their prescriptions followed the Consensus Guidelines relative to the patients' eligibility for coverage (defined below) of the prescribed drugs.

- *Group A:* The operational definition was physicians who, contrary to Consensus Guidelines, prescribed traditional NSAIDs alone to more than 60%² of their elderly at-risk osteoarthritis patients when these patients' access to recommended gastroprotective agents was restricted. Fourteen physicians met the above definition.
- *Group B:* The operational definition was physicians who prescribed Consensus Guidelines–recommended, LU agents (e.g., coxib or NSAID+PPI) for more than 70% of their elderly at-risk osteoarthritis patients despite the restriction of these patients' access. Twenty-six physicians met the above definition.
- *Group C:* The third group of physicians was defined by not belonging to Groups A or B, which means their prescribing behaviour was more varied. Sixty-two physicians were in this category.

DRUG COVERAGE IMPACT SELF-ASSESSMENT

As part of the CANOAR questionnaire, physicians were asked, “If drug coverage were different, would treatment have been different?” Their responses were used as an indicator of how they perceived that a patient's drug coverage status affected their prescribing behaviour.

Dependent variable

PRESCRIPTIONS

NSAIDS are a common and effective measure to manage the pain and inflammation of osteoarthritis. The choice of NSAID for elderly OA patients can be seen as having two steps, the first being whether or not to consider gastroprotection. The second step can be seen as the decision between traditional NSAIDs with a separate gastroprotective agent (GPA) or newer selective coxibs, which have been shown to reduce the risk of adverse GI effects in direct comparisons with traditional non-selective NSAIDs (Lisse et al. 2003; MacDonald et al. 2003; Hunt et al. 2003). For this study, prescriptions were classified in three ways: (1) the prescription of non-selective NSAIDs alone without any GPA was regarded as open-listed and non–evidence-based; (2) a non-selective NSAID plus a GPA other than a PPI was regarded as open-listed and evidence-based; (3) the prescription of a coxib or an NSAID+PPI was classified as limited use–restricted and evidence-based.

Analyses

Differences in physician characteristics across groups were examined with one-way ANOVAs and chi-square analyses, using likelihood ratios (LRs) as the variables were nominal. Non-evidence-based versus evidence-based prescriptions were examined using descriptive and chi-square analyses. The impact of patients' access to LU drugs across categories of EBM prescribing behaviour was also explored by conducting chi-square analyses for each type of physician. All analyses used the SAS statistical program v. 8.1.

Results

Physician characteristics

Tables 1 and 2 present data on physician characteristics across the three defined groups. There were no significant differences observed for years in practice, number of elderly at risk patients, number of elderly at risk patients with restricted access, and practice setting (see Table 1). Furthermore, there were no significant differences found across the three physician groups (Table 2). This indicates that it is not these physician characteristics that influence prescribing. More detailed examination of physicians' prescribing behaviour was required.

TABLE 1. One-way analysis of variance for physician characteristics by the three physician groups

Variable	Physician	Mean (SD)	Range
Years of practice	Group A	24.4 (10.4)	9–39
	Group B	25.6 (9.0)	12–43
	Group C	25.4 (9.6)	9–51
One-way ANOVA	$F=0.06$	$df(2, 78)$	$p=.942$
Number of at-risk patients per physician	Group A	21.0 (15.4)	2–47
	Group B	15.8 (15.1)	1–50
	Group C	21.7 (12.3)	1–64
One-way ANOVA	$F=1.83$	$df(2, 99)$	$p=.166$
Number of at-risk patients defined as having restricted access per physician	Group A	12.9 (10.6)	1–32
	Group B	11.8 (10.9)	1–35
	Group C	15.9 (9.3)	1–41
One-way ANOVA	$F=1.75$	$df(2, 99)$	$p=.179$

TABLE 2. Type of practice by physician groups

	Group Row % (n)	Solo Row % (n)
Group A	58% (7)	42% (5)
Group B	33% (5)	67% (10)
Group C	31% (17)	69% (37)
$\chi^2(2)=3.1, p=0.210$		

Application of evidence-based guidelines in prescribing

Once physicians decide to prescribe NSAIDs to an elderly patient with osteoarthritis, they need to determine whether or not to follow recommendations for mitigating the risk of adverse GI events, assuming that they are aware of the recommendations. The examination of prescribing behaviours by the physician groups using patient-level data is shown in Table 3.

TABLE 3. Types of prescriptions by physician groups

Physician groups (patient n)	NSAID Alone	NSAID+GPA^a or Coxib
Overall	24% (507)	76% (1,640)
Group A (294)	56% (165)	44% (129)
Group B (410)	8% (32)	92% (378)
Group C (1,443)	21% (310)	79% (1,133)

^a Including the proton pump inhibitor (PPI) GPAs

Overall, the majority of patients were given prescriptions according to published recommendations (i.e., coxib or NSAID+GPA). A different picture emerged when the data were split across physician groups. Group A physicians were the most likely to prescribe NSAIDs alone, while Group B physicians were the most likely to prescribe NSAIDs+GPA or coxib. The Group C physicians appeared to be more like Group B than Group A physicians in this regard.

Impact of drug coverage on physician prescribing

The physician groups were also compared regarding the self-reported impact of insurance coverage on drug choice. Although three-quarters of patients in the data set

met the definition of restricted access, 15% of Group A physicians stated they would change their treatment if coverage were different, compared with 26% of Group C physicians and only 8% of Group B physicians.

Consensus Guideline–compliant prescriptions

In order to determine what effect access restrictions of the ODBP formulary have on the actual prescription of LU drugs recommended in the Consensus Guidelines, that is, PPI or coxib, those prescriptions were examined across the physician groups. Table 4 presents the percentages of prescriptions for elderly at-risk OA patients stratified by physician groups and patient-level ODBP restrictions. Chi-square analyses showed that only Group C physicians appear to be affected by the ODBP restrictions. Group B physicians consistently prescribe LU-restricted drugs to their elderly at-risk patients, while Group A physicians have a non-significant increase in prescribing drugs with an LU listing when patient access is not a constraint.

TABLE 4. Evidence-based prescriptions and patient accessibility to drugs across physician groups

		ODBP Open-Listed	ODBP Limited-Use Listed
Physician Groups (patient n)	Patient Access Category	NSAID+GPA Row % (n)	Coxib or NSAIDs+PPI^a Row % (n)
Group A (129)	Restricted	26% (13)	74% (37)
	Unrestricted	15% (12)	85% (67)
	$\chi^2(1)=2.3, p=0.130$		
Group B (378)	Restricted	8% (22)	92% (262)
	Unrestricted	5% (5)	95% (89)
	$\chi^2(1)=0.60, p=0.430$		
Group C (1,133)	Restricted	43% (349)	57% (467)
	Unrestricted	19% (61)	81% (256)
	$\chi^2(1)=54.7, p<0.001$		

*** $p<.0001$

^a Only 40 NSAIDs+PPI prescriptions were written: Group A – 3 who did meet the criteria and 1 who did not; Group B – 7 who did meet the criteria and 1 who did not; and Group C – 16 who did meet the criteria and 12 who did not.

Discussion

This study examined the effects of reimbursement policy on prescribing in a primary care setting. The findings suggest that the majority of elderly at-risk osteoarthritis

patients are prescribed NSAIDs in a manner consistent with published recommendations, although up to one-quarter do not receive gastroprotective therapy and are at risk for GI bleeding (Mamdani et al. 2002a).

Willingness to prescribe LU-restricted drugs recommended in the Consensus Guidelines varied according to patients' eligibility for reimbursement. Group C physicians showed a clear preference for using LU-restricted drugs to provide gastroprotection for at-risk patients who had no barriers to reimbursement. The impact of formulary restrictions, therefore, can be estimated from the relative inhibition in prescribing choice seen in the cohort of patients defined as restricted. These are, in fact, the majority of patients in the study and the majority of patients seen by Group C physicians. While Group C physicians' drug preference is still evident in that 57% of prescriptions written for restricted patients are for LU products, this rate is 24% lower than for patients not affected by formulary policy. Group C physicians also report the highest percentage of treatments that would be different if drug coverage were different. Group A and B physicians appear to be less influenced by reimbursement restrictions but, by definition, represent polar opposites in terms of their approach to gastroprotection when prescribing NSAIDs to elderly OA patients. While the impact of formulary restrictions revealed in our study might be considered moderate, these results do have important implications for the equity and quality of patient care.

The current study makes the assumption that physicians choose to address the need for gastroprotection in elderly osteoarthritis patients before they choose which option to use for the gastroprotective effect, that is, NSAIDs+GPA or coxib. Slightly more than half of those patients offered gastroprotection received LU prescriptions, although the majority (66%) of this subset of patients did not meet the LU criteria for reimbursement, presenting a potential dilemma for the physician. When only prescriptions for LU-restricted drugs are examined, it appears that ODBP restrictions do not strongly influence the prescribing by Group A physicians. The relatively low percentage of affirmative answers to the question of whether these physicians would change their treatment if drug coverage were different strengthens this argument. However, Group A physicians also do not appear to be as strongly influenced by published evidenced-based recommendations as their peers.

In contrast, Group B physicians had an even lower percentage who reported they would change their treatment if drug coverage were different, but were the highest prescribers of Consensus Guideline-recommended drugs (almost exclusively coxib). These physicians may have been the early adopters for these new drugs, as coxibs had only been listed by the ODBP in April 2000 (Mamdani et al. 2002b). As a corollary to this speculation, Group A physicians may have been waiting for leadership from their peers in order to begin prescribing coxibs more frequently, and were currently doing so only for cases they saw as highly in need of that alternative. Because at the time of our study, LU prescriptions required some additional steps (e.g., special forms

and selection of appropriate codes), administrative barriers may also have influenced willingness to write LU prescriptions. We might speculate that Group B physicians may also be the most concerned with decreased compliance, GPA-related adverse effects and increased out-of-pocket costs associated with separate GPA prescriptions (Elliott et al. 2006).

Across all physician types there were cases of these elderly at-risk patients being prescribed NSAIDs alone. While this finding raises concerns about the efficacy of current mechanisms to convert clinical practice guidelines into usual care, we can't discount that these prescriptions may have reflected the patients' wishes, analogous to the experience with ASA and stroke patients (Short et al. 2003). Physicians are often aware of their patients' expectations and incorporate these into their clinical decisions (Haynes and Haines 1998; Tomlin et al. 1999). Alternatively, if coverage was not available, physicians may not have informed their patients that there was a drug demonstrated to reduce the risk of adverse GI effects. Previous research has found that physicians will avoid the issue of restrictions by selectively informing patients of possible treatments only if they meet the reimbursement criteria (Wynia et al. 2003).

Prescriptions of traditional NSAIDs alone may also have occurred because the physicians were not convinced of the therapeutic value of coxibs or GPAs. This possibility may be the case especially for the Group A physicians, who were the most likely to prescribe NSAIDs alone. Previous research has shown that physicians place greater emphasis on their own clinical experience and the experiences of their peers than on external sources like drug company detailing or formulary or other third-party recommendations (Tomlin et al. 1999; Mayer and Piterman 1999). Thus, physicians can have personal formularies based on these experiential influences, and not on research results presented in the literature or elsewhere (Robertson et al. 2001). In this regard, the disparity in prescribing practices that defined physician groups in this study needs to be acknowledged from a medical education perspective. Effective translation of EBM into optimal health outcomes requires a deeper understanding of the attitudes and processes that physicians adopt towards continuous learning in their practice of medicine.

Limitations

This study has several limitations. First, voluntary physician participants recorded the data, and studies have shown that this method can change usual behaviours (Clinard et al. 2001). Further, these physicians were invited to participate in CANOAR because they were high prescribers of NSAIDs (including coxibs). This situation could make them a biased sample with respect to the prescription of these drugs; although arguably, because these physicians have more experience prescribing NSAIDs than the average GP, they might be expected to be more familiar with the associated risks and benefits.

Second, this was a cross-sectional, retrospective study based on secondary data that were not collected for the current analysis. As a result, potentially important variables were not included in the original data set, for example, doctors' beliefs and attitudes towards drug formularies and the practice of evidence-based medicine. As well, potentially relevant patient characteristics, such as overall health status, income and willingness to pay, were not available.

Finally, there may be several possible interpretations of the drug coverage question, by physicians in the first instance and by the authors of this study in the second instance. Answering that treatment would not change if drug coverage were different could indicate that the physician consciously excluded reimbursement considerations when prescribing. There is also a possible bias towards answering that they would not change their prescription because an affirmative answer could be interpreted as an admission to not having prescribed appropriate treatment in the first place. Answering that their treatment would change may be interpreted as a preference to prescribe a different, restricted drug if reimbursement barriers were removed, but can also be interpreted as the physician's acknowledgment that he or she would switch from the first-choice therapy if that particular patient had a more restrictive drug plan.

Future direction

Despite the above limitations, this study suggests that formulary restrictions can influence the prescribing behaviour of physicians who otherwise might have prescribed based on the evidence of clinical risk versus benefit alone. This result raises important questions about how physicians resolve the conflict between their agency for the patient and for the healthcare system in the course of real-world clinical practice.

This study points to the need to elucidate physician-specific factors such as knowledge, values and self-efficacy (Levine and Cosby 2002). A better understanding of these factors can then inform research into the construction and content of prescription decision-making algorithms.

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ACKNOWLEDGMENTS

Parminder Raina holds a Canadian Institute of Health Research Investigator award and an Ontario Premier's Research Excellence award. We would also like to thank Helen Massfeller and Roxanne Cheeseman for their help in the preparation of this paper. This research was supported by a grant from Merck Frosst Canada.

NOTES

1. This study was conducted prior to the recent controversy surrounding Cox-2-specific inhibitors. That controversy does not invalidate the findings presented here.
2. A series of sensitivity tests were conducted on different percentages with the same statistical results.

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The Case of Osteoarthritis Prescribing Practices in Ontario

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