

Knee Osteoarthritis Clinical Practice Guidelines — How Are We Doing?

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ABSTRACT. Objective. To determine the degree to which documented knee osteoarthritis (OA) care in a teaching rheumatology clinic corresponds to evidence-based treatment guidelines.

Methods. The charts of 105 randomly selected patients meeting criteria for knee OA were reviewed. The patients received care from 3 rheumatologists working in a major Canadian teaching center between 2002 and 2005. The chart abstraction tool was based on European League Against Rheumatism, American College of Rheumatology, and The Arthritis Society guidelines for OA treatment. Descriptive statistics were used for patient demographics and the proportion of patients receiving recommended care.

Results. The most frequently recommended nonpharmacologic treatments were any kind of exercise (58.1%), weight loss in those overweight (50.0%), physiotherapy (42.9%), and strengthening exercise (40.0%). Other nonpharmacologic treatments were documented in less than 30% of patient charts. The most frequently prescribed pharmacologic treatments were acetaminophen (68.6%), intraarticular (IA) corticosteroids (65.7%), nonsteroidal antiinflammatory drugs/cyclooxygenase-2-selective inhibitors (COXIB; 50.5%), and IA hyaluronans (43.8%). Topical pharmaceuticals, glucosamine/chondroitin, and opioid analgesics were recommended to less than 20% of the patients. Exploratory analyses suggested the following factors may be associated with increased documentation of recommended care: female sex, younger age, overweight, more clinic visits, decreased symptom length, and the individual rheumatologist.

Conclusion. Nonpharmacologic knee OA treatments currently recommended by practice guidelines were seldom documented in patients' charts in this Canadian rheumatology teaching center. These findings are similar to studies conducted before the practice guidelines became available and to results reported from general practices. This suggests the need for reminder systems or other strategies to promote physician adherence to current guidelines. (First Release Aug 15 2007; *J Rheumatol* 2007; 34:2099–105)

Key Indexing Terms:

OSTEOARTHRITIS KNEE PRACTICE GUIDELINES QUALITY OF HEALTHCARE

Osteoarthritis (OA) is a leading cause of longterm disability and chronic health problems and has a high economic burden^{1,2}. A great deal of research relates to knee OA, as the knee

is a commonly affected joint³. The current goals in knee OA management are to reduce pain, maintain or improve joint mobility, and limit functional impairment, as there are no currently approved disease modifying drugs for OA⁴. Clinical practice guidelines have been proposed as a strategy to facilitate the use of research evidence in practice.

A number of investigators have evaluated management of knee OA by general practitioners (GP) and have found that adherence to guidelines was poor⁵⁻⁷. Many studies have shown that nonpharmacologic knee OA therapies are underprescribed⁵⁻¹⁰. The limitations of these studies are the restricted number of nonpharmacologic knee OA treatments assessed^{6,7} and reliance on physician self-reporting^{5,6}. Physician self-reporting is an idealized version of practice behavior. In fact, after reviewing 10 studies using objective and self-report measures, Adams, *et al* report that clinicians tend to overestimate their adherence to recommended norms by 27%. They strongly recommend that self-report "no longer be considered scientifically defensible" as the sole measure of quality of care¹¹.

There are only 2 studies of the knee OA treatment practices of rheumatologists, one of which relied on physician self-

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reporting^{8,12}. A study by Hochberg, *et al*, which relied on practitioner self-reporting, found that only one-half of the 1000 community based rheumatologists they surveyed frequently prescribed exercise, physiotherapy, or ambulatory aids to patients with knee OA¹². Mazzuca, *et al* conducted surveys of 201 patients from the practices of community and academic rheumatologists⁸. They found that nonpharmacologic treatments were being “grossly underutilized,” with most being prescribed less than 50% of the time. However, this study preceded the release of most OA practice guidelines, and did not evaluate many currently recommended treatments such as topical nonsteroidal antiinflammatory drugs (NSAID), topical capsaicin, glucosamine, chondroitin, intraarticular (IA) hyaluronans, referral to physiotherapy or occupational therapy, social support, orthoses/bracing/taping, acupuncture, or assistive devices for ambulation. The study was also subject to patient recall bias and had poorly defined inclusion criteria, with no explanation of how the diagnosis of knee OA was made. To our knowledge there are no published studies of the knee OA treatment practices of Canadian rheumatologists.

Our main purpose, therefore, was to determine the degree to which comprehensive evidence-based knee OA treatment guidelines were being provided to patients in a Canadian academic center rheumatology clinic as determined from retrospective chart abstraction. Our secondary objective was to explore patient, provider, or disease characteristics that predicted whether the rheumatologists would offer recommended knee OA treatments. Our hypothesis was that many recommended knee OA treatments were not being provided or documented. If this hypothesis was true, care could be enhanced by interventions such as reminder systems to promote rheumatologist use and documentation of evidence-based recommendations. Information of this kind will also inform the design, implementation, and evaluation of future guidelines.

MATERIALS AND METHODS

Patients. After ethics approval was received from the Research Ethics Board of Sunnybrook and Women’s College Health Sciences Centre, a retrospective chart review was performed of 105 patient charts from the practices of 3 rheumatologists working in a major urban teaching center. Charts were included in the audit and review if the patient met the American College of Rheumatology (ACR) clinical and/or clinical and radiographic criteria for the diagnosis of knee OA¹³, and if the first consult was no earlier than 1999 and the most recent encounter occurred between 2002 and 2005. Patient charts were excluded if there was previous sepsis of the knee joint; concomitant inflammatory arthritis; chondrocalcinosis seen on knee radiographs; or crystal arthropathy. Patients were also excluded if they attended the clinic solely for the purpose of research studies.

A patient database and the previous 6 months’ billing summaries were used to identify patient charts with the diagnosis of “osteoarthritis.” These charts were assigned a number and randomly selected using a random number generator to be examined for the study inclusion and exclusion criteria. The first 35 charts from each of the 3 rheumatologists that met criteria were included in the study. A sample size of convenience was chosen at a total of 105 charts.

Chart abstraction. The data abstraction tool was designed based on the following comprehensive OA treatment guidelines: the 2003 European Union League Against Rheumatism (EULAR) knee OA treatment recommenda-

tions¹⁴; the 2000 ACR recommendations for management of OA of the hip and knee⁴; and The Arthritis Society (TAS) Getting a Grip on Arthritis⁵ Best Practices for Osteoarthritis published in 2006¹⁵. Of the ACR, EULAR, and TAS comprehensive OA treatment guidelines, EULAR is the only one to provide explicit grading of the strength of evidence for each treatment (Table 1). There is good consensus across guidelines for most knee OA treatment, especially those with the strongest supporting evidence in the literature^{4,16-18}.

The charts were reviewed to identify baseline patient characteristics and symptom profiles, including initial consult date, age, sex, height, weight, comorbid illnesses, contraindications to NSAID use, symptom characteristics, functional limitations, Health Assessment Questionnaire Disability Index (HAQ-DI)¹⁹, and pain as measured on a 10 cm visual analog scale (VAS). Provider use of comprehensive knee OA treatments was documented, including education, social support, weight loss, exercise, physiotherapy, physical modalities, analgesia, other pharmacotherapy, IA injections, and referrals to other healthcare providers. Overweight was defined as either a descriptor of “overweight” or “obese” in the chart or body mass index ≥ 25 . The provision of education was considered positive if the patient was referred for a formal arthritis self-management program, or education was explicitly documented or if it was written that the disease, prognosis, and/or treatment were “discussed, counseled, or explained” to the patient. A data collection spreadsheet was used to record data and calculate descriptive statistics. Reliability of chart abstraction was tested for 10 charts, where an independent reviewer reviewed the charts, and the data abstracted by the 2 reviewers were compared.

Statistical analysis. Descriptive statistics were used to analyze patient demographics and the proportion of patients provided with comprehensive knee OA treatment recommendations by the rheumatologists. The kappa statistic was used to assess reliability of data abstraction. A value of 1 signifies perfect agreement, 0.81–1 almost perfect, 0.61–0.8 substantial, 0.41–0.60 moderate, 0.21–0.40 fair, 0.01–0.2 slight, and ≤ 0 poor agreement²⁰.

Univariate analyses were performed with 10 independent variables and 3 dependent variables using continuity adjusted chi-squared analysis and the student’s t test (SAS Version 8.2, SAS Institute Inc., Cary, NC, USA). The independent variables were age, sex, comorbidity, number of visits to the rheumatologist, symptom length, use of a gait aid (as a proxy for function), previously seen by rheumatologist or orthopedic surgeon, which rheumatology provider, previously recommended treatment, and overweight. Pain VAS and HAQ-DI could not be used due to a significant proportion of charts missing these pieces of data. The dependent variables were documentation of education, exercise, and use of acetaminophen. These 3 were selected as they were EULAR grade A recommendations with strong evidence to support them and could be considered applicable to virtually all patients with knee OA.

Exploratory multivariate multiple logistic regression analyses were performed to identify variables associated with the 3 dependent variables (education, exercise, acetaminophen). Given the available sample size it was decided to restrict the model to 6 independent variables. The following were selected because they have been associated with the use of knee OA treatments in other studies: age^{5,9,10}, female sex^{7,9}, symptom length⁵, and having seen a specialist prior^{7,10}. Higher disability⁹, pain⁷, and severity of OA¹⁰ have also been associated with provision of treatments. We used “walking aid” as a proxy for pain and disability since only a minority of charts documented pain or disability measures, and it has been shown that use of a walking aid is higher in patients with increased pain, disability, and age²¹.

RESULTS

Patient population. Patient characteristics are summarized in Table 2. The mean age of the patients was 67 years (range 42–95). Eighty percent of the patients were female. Seventy-seven percent were overweight; however, the weight status was recorded only in 65% of the charts. The average number of visits per patient was 7 (range 1 to 32). The average symptom length prior to first consult was 9 years (range 1 mo to 53 yrs). Fifteen percent of patients used a walking aid at baseline.

Table 1. Comparison of the commonalities of 3 comprehensive osteoarthritis guidelines.

OA Treatment Recommendation	EULAR 2003 for Knee OA ¹⁴	ACR 2000 for Hip and Knee OA ⁴	TAS 2006 for OA ¹⁵
Education	+ (1A-A)*	+ (ASMP)	+
Exercise	+ (1B-A)*	+	+
Social support	+ (1B-B: telephone)*	+	+
Weight loss	+ (1B-B)*	+	+
Orthoses: knee bracing/taping, shoe inserts	+ (1B-B)*	+	-
Physiotherapy	-	+	+
Assistive devices for ambulation	-	+	-
OT/joint protection/energy conservation	-	+	+
Assistive devices for ADL	-	+	+
Acupuncture	+ (1B-B)*	-	+
Acetaminophen	+ (1B-A)*	+	+
Opioid analgesics	+ (1B-B)*	+	-
NSAID	+ (1A-A)*	+	+
COXIB	+ (1B-A)*	+	+
Topical NSAID	+ (1A-A)*	+	+
Topical capsaicin	+ (1A-A)*	+	+
IA hyaluronans	+ (1B-B)*	+	+
IA corticosteroids	+ (1B-A)*	+	+
Glucosamine	+ (1A-A)*, **	-	+
Chondroitin	+ (1A-A)*, **	-	-
Orthopedics referral	+ (1B-B, Lavage/tidal irrigation)*, **	+	+

+: recommendation given; -: recommendation not given; * level of evidence — strength of recommendation for definitions of the categories see EULAR guidelines¹⁴; EULAR: European Union League Against Rheumatism; ACR: American College of Rheumatology; TAS: The Arthritis Society; ASMP: arthritis self-management programs; OT: occupational therapy; ADL: activities of daily living; NSAID: nonsteroidal antiinflammatory drug; COXIB: cyclooxygenase-2 inhibitor antiinflammatory drug; IA: intraarticular; ** Since the publication of the EULAR guidelines¹⁴ additional randomized controlled trials have questioned the benefit of glucosamine/chondroitin and articular lavage.

Table 2. Baseline patient characteristics.

Characteristic	n = 105
Age, yrs, mean (range)	66.9 (42–95)
Female, %	80.0
Overweight, %	76.5, n = 68
Number of visits, mean (range)	6.7 (1–32)
Symptom length, yrs, mean (range)	8.6 (1 mo–53 yrs)
% ≤ 1	26
% > 1, ≤ 5	35
% > 5	39
HAQ-DI, mean (range)	0.85 (0–2.25), n = 34
Walking aid use, %	15.2
Pain 10 cm VAS, mean (range)	4.9 (0.4–9.5), n = 28
Age adjusted Charlson Comorbidity score, mean (range)	2.9 (0–8)
Previously seen by orthopedics/rheumatology, %	45.7

HAQ-DI: Health Assessment Questionnaire — Disability Index; VAS: visual analog scale.

The average baseline HAQ-DI was 0.85, but this information was recorded in only 32% of the charts. The average baseline pain VAS was 5 out of 10, but this was available in only 27% of the charts. Mean baseline age-adjusted Charlson Comorbidity score was 2.9, which corresponds to a predicted

10-year survival of 77%²². At baseline, 46% of patients had been previously seen by an orthopedic surgeon or rheumatologist for their knee symptoms.

Reliability of data abstraction and collection. The average kappa for chart abstraction of OA treatment recommendations and independent variables was excellent at 0.88, with a median and mode of 1. The kappa values for education, exercise, and acetaminophen were 0.55, 1.0, and 0.78, respectively. One variable (IA corticosteroid injection) had a kappa value of 0, despite concordance in 9 out of 10 charts. This may be an artifact due to the high prevalence of this treatment.

Knee OA recommendations — nonpharmacologic management. The most frequently recommended nonpharmacologic treatments were any kind of exercise (58.1%), weight loss in those overweight (50.0%), physiotherapy (42.9%), and strengthening exercise (40.0%) (Table 3). Other nonpharmacologic treatments were documented in less than 30% of patient charts. Education was documented in 28.6% of patient charts and education via arthritis self-management programs was recommended to 2.9% of patients. Recommendations for aerobic and range of motion exercises were documented in 18.1% and 2.9% of charts, respectively. Prior to the initial rheumatology consult, many patients had already tried a num-

Table 3. Chart documentation of knee OA treatment recommendations by 3 rheumatologists in a teaching practice.

Knee OA Treatment Recommendation	Given (%)	Prior (%)
Education	28.6	1.9
Formal OA self-management program	2.9	0
Exercise — any	58.1	45.7
Strength/resistance training	40.0	14.3
Social support	1.9	0.0
Weight loss (in those who were overweight)	50.0	25.0
Orthoses: knee bracing/taping, shoe inserts	21.9	21.9
Physiotherapy	42.9	34.3
Assistive devices for ambulation	5.7	15.2
OT/joint protection/energy conservation	5.7	1.9
Acupuncture	3.8	3.8
Acetaminophen	68.6	54.3
Opioid analgesics	8.6	21.0
NSAID/COXIB*	50.5	86.7
Topical NSAID	15.2	5.7
Topical capsaicin	0.0	0.0
Intraarticular hyaluronans	43.8	10.5
Intraarticular corticosteroids	65.7	19.0
Glucosamine/chondroitin	16.2	29.5
Orthopedics referral — any	38.1	36.2
Orthopedics referral — arthroplasty	31.4	11.4

* There were NSAID contraindications, risk factors, or intolerance in 69.5% of patients. Given: recommendation given/documentated by the rheumatologist; prior: patient tried or recommended to try treatment prior to first rheumatology consult; OT: occupational therapy; NSAID: non-steroidal antiinflammatory drugs; COXIB: cyclooxygenase-2 inhibitor antiinflammatory drugs.

ber of nonpharmacologic OA therapies. About half had already tried exercise and one-quarter had tried weight loss, orthoses, and/or physiotherapy.

Knee OA recommendations — pharmacologic management. The most frequently prescribed pharmacologic treatments were acetaminophen (68.6%), IA corticosteroids (65.7%), NSAID/COXIB (50.5%), and IA hyaluronans (43.8%) (Table 3). Some treatment recommendations included in guidelines such as topical NSAID (15.2%), topical capsaicin (0%), glucosamine (16.2%), and chondroitin (9.5%) were documented in less than 20% of the charts. Prior to the initial rheumatology consult a high proportion of patients had already tried NSAID/COXIB and acetaminophen. More than two-thirds of patients had risk factors for NSAID use (hypertension, peptic ulcer disease, gastrointestinal bleed, anticoagulation, renal failure), NSAID allergy, or NSAID intolerance.

Factors associated with the provision of knee OA treatment recommendations. In the chi-squared analysis, trends were seen for female sex, younger age, overweight, and rheumatology provider for association with increased documentation of education, but only female sex was statistically significant ($p = 0.003$; Table 4). Trends were seen for female sex, younger age, overweight, and rheumatology provider to be associated with increased recommendation to exercise, but only overweight ($p = 0.0025$) and rheumatology provider ($p = 0.0088$)

Table 4. Factors associated with the recommendation of education, exercise, or acetaminophen based on univariate analyses.

	Education		Exercise		Acetaminophen	
	%	p	%	p	%	p
Sex						
Female	35.7	0.003*	63.1	0.067	70.2	0.64
Male	0.0		38.1		61.9	
Age, yrs						
≤ 67	35.0	0.14	66.7	0.064	71.7	0.56
> 67	20.0		46.7		64.4	
Number of visits						
≤ 2	34.8	0.73	60.9	0.31	60.9	0.001*
3–6	28.2		48.7		51.3	
> 6	25.6		65.1		88.4	
Symptom length, yrs						
≤ 1	30.8	0.25	65.4	0.35	76.9	0.0025*
1.1–5	37.8		48.6		83.8	
> 5	20.5		61.5		48.7	
Comorbidity [†]						
0	29.1	1.00	52.7	0.33	67.3	0.93
≥ 1	28.0		64.0		70.0	
Gait aid						
Yes	33.3	0.79	52.4	0.73	71.4	0.32
No	27.4		59.5		57.1	
Prior specialist						
Yes	31.3	0.73	56.3	0.88	66.7	0.86
No	26.3		59.6		70.2	
Overweight						
Yes	37.3	0.28	76.5	0.0025*	74.5	0.90
No	18.8		31.3		68.8	
Prior treatment						
Yes	0.0	0.91	66.7	0.15	66.7	0.81
No	29.1		50.9		70.8	
Rheumatology provider						
1	20.0	0.07	68.6	0.0088*	51.4	0.024*
2	42.9		68.6		74.3	
3	22.9		37.1		80.0	

[†] As defined in the Charlson Comorbidity Index. * $p < 0.05$.

were statistically significant. The Student T-test showed that those recommended exercise were younger than those who were not ($p = 0.019$). Increased number of visits ($p = 0.001$), decreased symptom length ($p = 0.0025$), and rheumatology provider ($p = 0.024$) were significantly associated with increased recommendation to use acetaminophen. Presence of comorbidities, use of ambulatory aid, previous rheumatology or orthopedics consult, or prior treatment were not significantly associated with documentation of education, exercise, or acetaminophen by the rheumatologists in our study (Table 4).

Exploratory multivariate regression models revealed no major associations and the models only accounted for 7–11% of the variability. However, using a gait aid ($p = 0.053$) and younger age ($p = 0.025$) were marginally significant predictors for receiving education. Female sex was marginally ($p = 0.056$ and $p = 0.046$, respectively) associated with a recommendation to exercise and use acetaminophen. Sex and prior receipt of education could not be included in the education model because of zero values in some subgroups causing a divide-by-zero error.

DISCUSSION

We report on the knee OA treatment practices of academic rheumatologists in a major Canadian teaching center as documented by chart audit. To our knowledge, only one previous study has reported comparable data that do not rely on practitioner self-reporting; that study was performed almost 10 years ago, before current guidelines became available⁸.

In our study many nonpharmacologic treatments recommended for knee OA had low rates of documentation, with several documented less than 30% of the time (education, aerobic and range of motion exercise, social support, orthoses, assistive devices for ambulation, acupuncture, and OT/energy conservation). Education and referral to arthritis self-management programs were documented in only 29% and 3% of patient charts, respectively. However, the provision of education is difficult to quantify by chart abstraction. This is reflected in the lower interrater reliability obtained for this variable in our study. Pharmacologic treatments such as acetaminophen, IA corticosteroids, and NSAID/COXIB were prescribed for more than 50% of the patients. Topical pharmaceuticals, glucosamine/chondroitin, and opioid analgesics were infrequently recommended, at less than 20% of the time.

Clinical judgment is required to determine the appropriateness of each treatment for individual patients, and the optimal level of provision of each recommendation is unknown. From the treatments we assessed, perhaps exercise, education, weight loss if overweight, and acetaminophen could be considered appropriate for all patients with knee OA. In our study, the highest rate of documentation for any of these treatments was 69% for acetaminophen.

During the past decade the evidence base supporting many knee OA treatments has grown and many OA clinical practice guidelines have been developed. Despite this, the results of our study are very similar to those found by Mazzuca, *et al* in 1997⁸. In our study nonpharmacologic treatments continue to be underutilized, with almost all treatments documented less than 50% of the time. In terms of pharmacologic treatments, one notable difference was a much higher recommendation rate for acetaminophen use in our study compared to Mazzuca's study (69% vs 14%)⁸. Higher rates of acetaminophen use (42.5%–90%) have also been reported in more recent studies evaluating knee OA management by GP^{6,7,10}.

Similarly, 2 studies of patients from the practices of Canadian GP also found underutilization of OA treatments^{9,10}. Most nonpharmacologic treatments were recommended less than 50% of the time^{9,10}. Interestingly, patients independently tried nonpharmacologic therapies more frequently than recommended⁹.

Three recent studies evaluated the use of comprehensive knee OA treatments by GP in Europe. Denoed, *et al* found that only 54.2% of GP recommended a combination of pharmacologic and nonpharmacologic treatments for knee OA⁵. Similarly, Chevalier, *et al* demonstrated that the GP did not

follow EULAR guideline recommendations, particularly non-pharmacologic recommendations, which were provided less than 50% of the time⁶. However both these studies relied on practitioner self-report for their data^{5,6}. A third study surveyed 466 patients with knee OA from the practices of 2 GP in the United Kingdom. All knee OA treatments were tried by less than 50% of the patients⁷.

In our study, exploratory regression and univariate analyses suggest the following factors might be associated with increased documented use of recommended treatments: female sex (education, acetaminophen), younger age (education, exercise), overweight (exercise), increased number of visits (acetaminophen), decreased symptom length (acetaminophen). There were also variations among the 3 rheumatologists on their documentation of exercise and acetaminophen. Other studies have found the following variables to be significantly associated with rate of use of OA therapies in patients of general practitioners: higher disability⁹, increased pain⁷, worse disease severity¹⁰, younger age^{5,10}, duration of symptoms⁵, overweight^{5,9}, female sex^{7,9}, having previously seen a specialist^{7,10}, and higher family income/social class^{7,9}.

The limitation of our study is that it was performed retrospectively, relying on chart documentation for data. The data set was limited to the type, consistency, and amount of information documented in the chart. In particular, formal outcome measures such as the HAQ-DI and pain VAS were lacking in most charts. This will make assessment of effectiveness of care difficult. Given the relatively small sample size, results from the regression and univariate analyses should be considered exploratory. Also, it is not certain that the documentation in the chart represents true clinician practice as some treatments and advice may not be recorded due to time constraints. Thus, our study may have underestimated provision of OA treatment recommendations by the rheumatologists. But in this era of healthcare accountability, chart documentation is often the only defensible position for quality assurance and reimbursement purposes. Lastly, we evaluated documented knee OA treatments, but we did not account for patient preferences or unique situations that make different treatments unsuitable for the patient.

Despite the rapid expansion of scientific research and creation of many clinical practice guidelines, incorporation of scientific evidence into medical practice remains poor²³. Even in the academic rheumatology practice evaluated in our study, many knee OA treatments with good evidence to support them remain underutilized, particularly nonpharmacologic treatments. Three main issues that influence the use of evidence in medical care are quality of evidence, barriers and facilitators to practice change, and effective dissemination and implementation strategies²³. Barriers to changing practice exist within the patient, professional, healthcare team, healthcare organization, and wider environment²³. Pencharz, *et al* evaluated 6 lower-limb OA guidelines including the EULAR and ACR guidelines and found that almost none of them addressed

implementation strategies and barriers to use of the guidelines¹⁸. In general, very few guidelines are evaluated for effectiveness of dissemination strategies, and even fewer for the health impact of the guideline²⁴. That our study results reveal deficiencies in knee OA treatment practice similar to those found almost a decade prior further supports the need for better guideline implementation and evaluation of outcomes^{8,24}.

Future research should be directed towards overcoming both patient and provider barriers to the use of OA guidelines and their documentation, guideline implementation, and evaluation of outcomes. Although the evidence for many knee OA treatments is good, the complexity and high number of treatment recommendations available for knee OA may be a hindrance to use of the guidelines. Many strategies have been evaluated to improve implementation of evidence into practice. Grimshaw, *et al* in their systematic review of strategies found that there was no “magic bullet” to promote implementation; however, generally effective strategies include financial interventions to physicians, reminder systems, interactive small-group meetings, and computerized decision support or a combination of some of these interventions^{23,25-28}. In one study, reminders had the largest average effect and were especially influential for prevention²⁶. Examples of reminders are provider prompts, computer assisted treatment plans, and patient prompts. Interventions targeted at specific barriers and combined interventions appear to be more effective^{23,25}. More education does not appear to be necessary as the rheumatologists in our study were aware of the available treatments; however, all therapeutic modalities were not consistently used. Therefore a checklist or other reminder system would seem to be appropriate. Patient-mediated strategies to promote guidelines are also effective and we propose that patients with OA be given a checklist of nonpharmacological treatment options to read in the waiting room. They should be encouraged to discuss these options with their doctor. This would serve to remind the physician and to stimulate educational and collaborative dialogue between the patient and doctor.

We found that nonpharmacologic knee OA treatments currently supported by evidence-based practice guidelines were seldom documented in patients’ charts in this Canadian rheumatology teaching center. The situation is comparable to studies conducted before most practice guidelines became available and to results reported from general practices. This suggests the need for evaluation of specific barriers to use of and implementation of reminder systems or other strategies to promote the use of current evidence-based guidelines.

REFERENCES

1. Lawrence RC, Helmick CG, Arnett FC, et al. Estimates of the prevalence of arthritis and selected musculoskeletal disorders in the United States. *Arthritis Rheum* 1998;41:778-99.
2. Badley EM, Rasooly I, Webster GK. Relative importance of musculoskeletal disorders as a cause of chronic health problems, disability, and health care utilization: findings from the 1990 Ontario Health Survey. *J Rheumatol* 1994;21:505-14.
3. Doherty M, Dougados M. Evidence-based management of osteoarthritis: practical issues relating to the data. *Best Pract Res Clin Rheumatol* 2001;15:517-25.
4. American College of Rheumatology Subcommittee on Osteoarthritis Guidelines. Recommendations for the Medical Management of Osteoarthritis of the Hip and Knee. 2000 Update. *Arthritis Rheum* 2000;43:1905-15.
5. Denoel L, Mazieres B, Payen-Chapmenois C, Ravaud P. First line treatment of knee osteoarthritis in outpatients in France: adherence to the EULAR 2000 recommendations and factors influencing adherence. *Ann Rheum Dis* 2005;64:70-4.
6. Chevalier X, Marre JP, de Butler J, Herceek A. Questionnaire survey of management and prescription of general practitioners in knee osteoarthritis: a comparison with 2000 EULAR recommendations. *Clin Exp Rheumatol* 2004;22:205-12.
7. Jordan KM, Sawyer S, Coakley P, Smith HE, Cooper C, Arden NK. The use of conventional and complementary treatments for knee osteoarthritis in the community. *Rheumatology Oxford* 2004;43:381-4.
8. Mazucca SA, Brandt KD, Katz BP, et al. Comparison of general internists, family physicians and rheumatologists managing patients with symptoms of osteoarthritis of the knee. *Arthritis Care Res* 1997;10:289-99.
9. Li LC, Maetzel A, Pencharz JN, Maguire L, Bombardier C. Use of mainstream nonpharmacologic treatment by patients with arthritis. *Arthritis Rheum* 2004;51:203-9.
10. Glazier RH, Badley EM, Wright JG, et al. Patient and provider factors related to comprehensive arthritis care in a community setting in Ontario, Canada. *J Rheumatol* 2003;30:1846-50.
11. Adams AS, Soumerai SB, Lomas J, Ross-Degnan D. Evidence of self-report bias in assessing adherence to guidelines. *Int J Qual Health Care* 1999;11:187-92.
12. Hochberg MC, Perlmuter DL, Hudson JI, Altman RD. Preferences in the management of osteoarthritis of the hip and knee: results of a survey of community-based rheumatologists in the United States. *Arthritis Care Res* 1996;9:170-6.
13. Altman R, Asch E, Bloch D, et al. Development of criteria for the classification and reporting of osteoarthritis. Classification of osteoarthritis of the knee. Diagnostic and Therapeutic Criteria Committee of the American Rheumatism Association. *Arthritis Rheum* 1986;29:1039-49.
14. Jordan KM, Arden NK, Doherty M, et al. EULAR Recommendations 2003: an evidence based approach to the management of knee osteoarthritis: Report of a Task Force of the Standing Committee for International Clinical Studies Including Therapeutic Trials (ESCISIT). *Ann Rheum Dis* 2003;62:1145-55.
15. Getting a grip on arthritis — A national primary health care community initiative. Health Canada Report. The Arthritis Society. June 30, 2006. Available at: www.arthritis.ca/gettingagrip (accessed June 28, 2007).
16. Pendleton A, Arden N, Dougados M, et al. EULAR recommendations for the management of knee osteoarthritis: report of a task force of the Standing Committee for International Clinical Studies Including Therapeutic Trials (ESCISIT). *Ann Rheum Dis* 2000;59:936-44.
17. Roddy E, Doherty M. Guidelines for management of osteoarthritis published by the American College of Rheumatology and the European League Against Rheumatism: why are they so different? *Rheum Dis Clin North Am* 2003;29:717-31.
18. Pencharz JN, Grigoriadis E, Jansz GF, Bombardier C. A critical appraisal of clinical practice guidelines for the treatment of lower-limb osteoarthritis. *Arthritis Res* 2002;4:36-44.
19. Fries JF, Spitz P, Kraines RG, Holman HR. Measurement of patient outcome in arthritis. *Arthritis Rheum* 1980;23:137-45.
20. Sim J, Wright CC. The kappa statistic in reliability studies: use, interpretation, and sample size requirements. *Phys Ther*

- 2005;85:257-68.
21. Van der Esch M, Heijmans M, Dekker J. Factors contributing to possession and use of walking aids among persons with rheumatoid arthritis and osteoarthritis. *Arthritis Rheum* 2003;49:838-42.
 22. Charlson ME, Pompei P, Ales KL, MacKenzie CR. A new method of classifying prognostic comorbidity in longitudinal studies: development and validation. *J Chron Dis* 1987;40:373-83.
 23. Grol R, Grimshaw J. From best evidence to best practice: effective implementation of change in patients' care. *Lancet* 2003; 362:1225-30.
 24. Graham ID, Beardall S, Carter AO, Tetroe J, Davies B. The state of the science and art of practice guidelines development, dissemination and evaluation in Canada. *J Eval Clin Pract* 2003;9:195-202.
 25. Grimshaw JM, Shirran L, Thomas R, et al. Changing provider behavior: an overview of systematic reviews of interventions. *Med Care* 2001;39 Suppl 2:II2-45.
 26. Grimshaw JM, Eccles MP, Walker AE, Thomas RE. Changing physicians' behaviour: what works and thoughts on getting more things to work. *J Contin Educ Health* 2002;22:237-43.
 27. Grimshaw J, Eccles M, Thomas R, et al. Towards evidence-based quality improvement. Evidence (and its limitations) of the effectiveness of guideline dissemination and implementation strategies 1966-1998. *J Gen Intern Med* 2006;21 Suppl 2:S14-20.
 28. Grimshaw JM, Thomas RE, MacLennan G, et al. Effectiveness and efficiency of guideline dissemination and implementation strategies. *Health Technol Assess* 2004;8:1-72.