

Drug Use Trends for Arthritis and Other Rheumatic Conditions and Effect of Patient's Age on Treatment Choice

Rishi J. Desai, Santosh J. Agarwal, Rajender R. Aparasu

BACKGROUND Little is known about the influence of the patient's age on selection of treatment for arthritis and other rheumatic conditions (AORCs). The aim of the present study was to examine drug use trends in patients with AORCs in ambulatory care and to study age-specific drug use.

METHODS Data from the National Ambulatory Medical Care Survey and the outpatient department component of the National Hospital Ambulatory Medical Care Survey were used to examine ambulatory visits for AORCs during 2001-2005. Use of nonsteroidal anti-inflammatory drugs (NSAIDs), analgesics (narcotics and nonnarcotics), steroids, and disease-modifying antirheumatoid drugs (DMARDs) was measured as the proportion of visits that resulted in a prescription. Age-specific drug use trends were determined separately for adult (19-64 years) and for elderly (≥ 65 years) patients.

RESULTS According to the national surveys, there were 208 million ambulatory visits for AORCs during the study period. Use of NSAIDs, analgesics, steroids, and DMARDs was found to be 33.3%, 23.5%, 15.7%, and 4.3%, respectively. Analgesic use increased from 18.3% in 2001 to 26.7% in 2005. DMARDs and NSAIDs were prescribed 1.2 times more to adult patients than to elderly patients. Steroids and analgesics were prescribed 1.3 and 1.2 times more, respectively, to elderly patients than to adult patients.

LIMITATION The findings do not translate to population-based prevalence measures, as the unit of analysis was the patient visit.

CONCLUSIONS NSAIDs remain the most frequently prescribed drug class for AORCs; however, there has been increased use of analgesics in recent years. The study findings suggest that the patient's age plays a role in the choice of drugs prescribed for AORCs.

Arthritis is a painful disease that manifests in the form of multiple rheumatic conditions, such as osteoarthritis, joint disorders, arthropathies, carpal tunnel syndrome, and rheumatoid arthritis [1]. Disability and work limitation are the main effects of arthritis and other rheumatic conditions (AORCs) in adults [2]. On the basis of data from the 2003-2005 National Health Interview Survey, the prevalence of arthritis in US adults is estimated to be 21.6% (46.4 million adults) [2]. Estimates based on data from the 2003 Medical Expenditure Panel Survey reveal that the direct, indirect, and total costs attributable to AORCs are \$80.8 billion, \$47 billion, and \$321.8 billion, respectively. In 2003, mean medical spending was \$6,978 per adult with AORC, and prescription bills averaged \$1,635 per person per year [3]. The public health burden of arthritis will continue to increase as the baby boomers age. According to the 2002 North Carolina Arthritis Report, the prevalence of arthritis in North Carolina is one of the highest in the nation [4]. The economic, clinical, and human burdens could potentially be reduced with timely medical attention and medication management.

Medication management is the mainstay of treatment of AORCs, and the main drug classes used are nonsteroidal anti-inflammatory drugs (NSAIDs), analgesics, steroids, and disease-modifying antirheumatic drugs (DMARDs). However, the treatment guidelines for different arthritic conditions differ. For patients suffering from rheumatoid

arthritis, guidelines suggest that DMARDs should be started within the first 3 months, to arrest the progression of the disease [5]. On the other hand, acetaminophen (nonnarcotic analgesic) is the agent of first choice for treatment of osteoarthritis, and NSAIDs are recommended if pain is not well-controlled with acetaminophen [6]. Steroid injections are reserved for treatment of patients with osteoarthritis of the knee who have effusion or local inflammation in osteoarthritis, according to the American College of Rheumatology recommendations for treatment of osteoarthritis [6]. Steroid use is generally recommended for treatment of rheumatoid arthritis if the patient is at risk of gastrointestinal bleeding from treatment with NSAIDs [5].

Some previous studies have examined drug use trends, but most have focused on specific and more-prevalent conditions of AORCs—mainly osteoarthritis and rheumatoid arthritis [7-9]. AORCs include more than 100 conditions, so drug use for less-prevalent arthritic conditions is often not accounted for in those studies. Only 1 study, by Hootman and colleagues [10], comprehensively evaluated the drug

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Address correspondence to Dr. Rajender R. Aparasu, Texas Medical Center, College of Pharmacy, Department of Clinical Sciences and Administration, 1441 Moursund St, Houston, TX 77030 (rraparasu@uh.edu).

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use trends for AORCs in ambulatory settings during a 1-year period. The purpose of the present study is to evaluate drug use trends for AORCs during a 5-year period. The majority of health care services for the treatment of AORCs are accessed through ambulatory care; therefore, data from the 2001-2005 National Ambulatory Medical Care Survey (NAMCS) and from the outpatient department component of the 2001-2005 National Hospital Ambulatory Medical Care Survey (NHAMCS) were used to examine drug use trends.

It has been shown in the literature that the patient's age influences the choice of pharmacotherapy prescribed by rheumatologists [11, 12]. This phenomenon is well-recognized in the delivery of health care and is studied extensively in fields such as oncology and cardiovascular diseases [13, 14]. Age-based variation in prescribing drugs is not well-documented in rheumatology. The present study evaluates the drug use trends at visits for AORCs by use of ambulatory care data. Analysis focused on 2 groups, adults (19-64 years) and the elderly (≥ 65 years), to evaluate the drug use trends. We hypothesize that the prescription of NSAIDs, analgesics, steroids, and DMARDs will be different between adults and the elderly because of the pharmacodynamics and pharmacokinetics of these medications.

Methods

Data source. Data from the NAMCS and the NHAMCS were used to capture ambulatory-care-related visits for AORCs in the United States. Only the outpatient department portion of the NHAMCS was used for the present study, since the medical care provided in these settings is similar to the care provided in office-based settings. The clinical nature of the visits in both surveys was collected using similar instruments. The present study was considered exempt by the institutional review board at the University of Houston, since the secondary analysis is based on public-use data files that protect the identity of patients.

The NAMCS is a national probability sample survey of visits to office-based physicians, whereas the NHAMCS is a national probability sample survey of visits to hospital outpatient and emergency departments. These surveys are conducted by the Centers for Disease Control and Prevention's National Center for Health Statistics (NCHS), and they are components of the National Health Care Survey, which measures health care use across a variety of health care providers [15, 16]. The NAMCS visits are sampled by use of a multistage clustered probability sample design that is based on geographic locations (primary sampling units), provider specialty, and number of visits to individual physicians. The NHAMCS visits are sampled on the basis of geographic locations (primary sampling units), hospitals within these areas, and clinics in the outpatient and emergency departments of these hospitals. The basic sampling unit for both the NAMCS and the NHAMCS is a single patient visit.

Data for the present study were derived from 5 survey

TABLE 1.
Demographic Characteristics of Patients Making Visits for Arthritis and Other Rheumatic Conditions (AORCs) in the United States

Variable	AORC visits
Age category	
Adults (19-64 years)	63.7 (61.2-66.2)
Elderly (>65 years)	36.3 (36.0-39.6)
Sex	
Female	62.1 (60.4-64.0)
Male	37.8 (36.0-39.6)
Race	
White	86.8 (85.0-88.6)
Black	10.1 (8.4-11.7)
Other	31.0 (2.3-4.0)
Main reason for visit	
Chronic problem	50.9 (49.1-54.7)
New problem	36.3 (34.0-38.5)
Preventive care/pre- or postsurgery	9.1 (7.8-10.4)
Unknown	2.7 (1.8-3.6)
Payment type	
Private insurance	50.2 (47.7-52.8)
Medicare	30.7 (28.5-32.9)
Medicaid	6.2 (5.2-7.2)
Other source ^a	9.4 (8.0-10.9)
Unknown	3.5 (2.6-4.4)
Region	
South	38.5 (32.9-44.0)
Midwest	21.6 (17.7-25.5)
West	21.3 (18.2-24.5)
Northeast	18.5 (14.9-22.1)
MSA	
MSA	81.5 (74.8-88.1)
Non-MSA	18.5 (11.9-25.2)
Prescription of any medication	
Yes	69.8 (67.1-72.5)
No	30.2 (27.5-32.9)

Note. Data are % (95% confidence interval). MSA, metropolitan statistical area.

^aOther payment sources include self-pay, no charge, worker's compensation, and other, unmentioned sources.

years (2001-2005). The NAMCS and the NHAMCS collected information on up to 6 medications in 2001 and on up to 8 medications during 2002-2005 that were prescribed at the end of a visit, including both a new and a continuing prescription. Information was collected on up to 3 diagnoses related to the visit. The staff collected the data using a visit encounter form for both surveys.

Operational definitions and analysis. The present study focused on the outpatient ambulatory care visits by adults (≥ 19 years) who received a primary diagnosis of AORCs. Visits for AORCs were defined using *International*

Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) codes, on the basis of the list provided by the 1995 National Arthritis Data Workgroup [10]. The list of ICD-9-CM codes used is provided in Table A1 of the Appendix (available only in the online edition of the NCMJ). Drugs were classified into 4 drug categories (NSAIDs, analgesics, steroids, and DMARDs) on the basis of the current pharmacotherapeutic options available for the treatment of AORCs. NSAIDs, analgesics, and steroids were defined using National Drug Code classifications. DMARDs were defined using the Ambulatory Care Drug Database System and the American Hospital Formulary System [10]. A list of drug definitions is provided in Table A2 of the Appendix (available only in the online edition of the NCMJ).

The drug use trends for AORCs were analyzed by evaluating prescribing practices in outpatient visits. National weighted estimates of ambulatory care visits were calculated using survey sample weights, to account for the multistage sampling design of the NHAMCS and the NAMCS. These weights were calculated for each visit by the NCHS on the basis of the reciprocal of sampling probability of a

health care facility, physician, and patient visit; they were also adjusted for nonresponse bias. Nonresponse bias arises when physicians or hospitals do not provide data, when physicians do not see any patients during the sample week, or when physicians fail to provide a patient record form for a visit. The NCHS weighting system accounts for nonresponse bias by assigning extra weights, from nonresponding cases to responding cases [15, 16]. The patient weights were derived by taking into account each visit's contribution inversely proportioned to the likelihood of that visit being sampled from all community-based visits. Patient weight can be interpreted as the total number of visits in the population that the sample visit represents, and it allows for extrapolation to national patterns of practice.

Estimates were considered to be reliable only if the relative standard error was below 30% and the unweighted sample size was more than 30 observations. The survey design variables in the NAMCS and the NHAMCS were used to calculate the 95% confidence interval (CI) and the standard error. The rates of drug prescription were calculated as the proportion of total visits for AORCs that resulted in a

TABLE 2.
Visits for Arthritis and Other Rheumatic Conditions, by Primary Diagnosis and Age Group, 2001-2005

ICD-9-CM code	Diagnosis	All patients	Adults (19-64 years)	Elderly (≥65 years)
274	Gout	2.7 (2.0-3.4)	2.4 (1.7-3.2)	3.1 (2.0-4.3)
446	Polyarteritis nodosa and allied conditions	0.5 (0.2-0.7)	...	0.9 (0.4-1.5)
711	Arthropathy associated with infections	0.2 (0.0-0.5)	...	...
714	Rheumatoid arthritis and other inflammatory polyarthropathies	6.4 (4.4-8.5)	6.8 (4.2-9.3)	5.9 (4.1-7.6)
715	Osteoarthritis and allied disorders	27.0 (24.7-29.4)	20.5 (18.1-22.9)	38.5 (35.0-42.0)
716	Other and unspecified arthropathies	8.1 (6.9-9.3)	7.8 (6.4-9.1)	8.7 (6.9-10.4)
719	Other/unspecified joint disorders (excluding 719.1)	20.0 (18.1-21.9)	22.9 (20.6-25.1)	15.0 (12.5-17.5)
720	Ankylosing spondylitis and other inflammatory spondylopathies	0.7 (0.3-1.1)	0.8 (0.4-1.2)	...
721	Spondylosis and allied disorders	4.0 (3.0-5.0)	3.6 (2.4-4.7)	4.9 (3.4-6.3)
725	Polymyalgia rheumatica	1.7 (0.9-2.5)	...	3.8 (2.1-5.6)
726	Peripheral enthesopathies and allied conditions	16.0 (14.5-17.5)	19.7 (17.6-21.8)	9.5 (7.6-11.3)
727	Other disorders of synovium, tendon, or bursa	8.9 (7.6-10.2)	10.2 (8.6-11.7)	6.7 (5.0-8.3)
728	Disorders of muscle, ligament, fascia (excludes 728.4 and 728.5)	3.7 (3.0-4.3)	4.4 (3.5-5.2)	2.4 (1.5-3.3)

Note. Data are % (95% confidence interval). Cells without data represent an unweighted frequency <30%. Calculation of weighted estimates and percentages would be inappropriate, as they do not meet the National Center for Health Statistics criteria required for reliable estimation. ICD-9-CM, *International Classification of Diseases, Ninth Revision, Clinical Modification*.

TABLE 3.
Proportion of Visits for Arthritis and Other Rheumatic Conditions that
Resulted in a Prescription during 2001-2005 (N = 208 million), by Age Group

Prescription	All patients	Adults (19-64 years)	Elderly (≥65 years)	P ^a
NSAIDs	33.3 (31.2-35.4)	35.1 (32.8-37.4)	30.1 (26.6-33.5)	.01
Analgesics	23.5 (21.7-25.4)	22.3 (20.2-24.4)	25.7 (22.8-28.7)	.04
Steroids	15.7 (13.8-17.5)	14.1 (12.4-15.8)	18.4 (15.4-21.5)	.001
DMARDs	4.3 (2.8-5.8)	5.0 (3.1-7.0)	3.0 (1.8-4.3)	.01

Note. Data are % (95% confidence interval). DMARDs, disease-modifying antirheumatoid drugs; NSAIDs, nonsteroidal anti-inflammatory drugs.

^aBy comparing adult patients with elderly patients on the basis of receipt of the respective medication during the 5-year period. Statistically significant at $\alpha = .05$.

prescription. The proportion hence obtained was converted into a percentage scale and reported. A subgroup analysis was conducted to examine age-specific drug prescription rates. Accordingly, the study population was divided into 2 age categories: adults (19-64 years) and the elderly (≥65 years). Age-specific drug prescription rates were calculated as the proportion of total visits made by patients in the age group for AORCs that resulted in a prescription. Statistically significant time trends in prescription use, by drug class, were identified using the logistic regression model, with 2001 serving as the reference year and indicator variables for 2002-2005 included as the only covariate. Statistically significant differences in drug prescription rates between age groups, by drug class, during a 5-year period were identified using a χ^2 test. SAS version 9.1 (SAS Institute, Cary, NC) survey procedures were used for analysis to account for the multistage clustered survey design of the NAMCS and the NHAMCS. An α level of .05 was selected to define significance in all statistical analyses.

Results

Primary diagnosis of AORCs accounted for a total of 208 million estimated visits by patients aged 19 years and older in ambulatory health care settings during 2001-2005; this represented 4.4% of the total visits in ambulatory health care settings during that period. A total of 63.7% of the AORC-related visits were made by adults. Women were approximately 1.6 times more likely to make visits than were men. More than 4 in 5 visits were made by white individuals. In approximately one-third of the visits, a new AORC-related problem was diagnosed, and approximately half the visits were reimbursed by private insurance; the next most-common sources of reimbursement were government sponsored Medicare and Medicaid. More than one-third of the visits occurred in the Southern region, and approximately four-fifths occurred in metropolitan areas. Nearly 70% of the visits resulted in at least 1 prescription (Table 1).

In the study sample, the most common AORCs during 2001-2005 were osteoarthritis and allied conditions (27% of the total visits), which were followed by other unspecified joint disorders (20%) and peripheral enthesopathies

and allied conditions (16%). A higher proportion of elderly patients were diagnosed with osteoarthritis (38.5%), compared with adult patients (20%). Table 2 shows the breakdown of AORC-related visits according to primary diagnosis at time of visit.

NSAIDs were found to be the most prescribed drug class during each of the 5 years (Table 2). The overall prescription rate for NSAIDs was 33.3% (95% CI, 31.2%-35.4%) during the study period. Analgesics and steroids were the second and third most frequently prescribed classes of drugs. An analgesic was prescribed at 23.5% (95% CI, 21.7%-25.4%) of visits for AORCs, and a steroid was prescribed at 15.7% (95% CI, 13.8%-17.5%) of visits for AORCs. DMARDs were the least frequently prescribed drug class, with a prescription rate of 4.3% (95% CI, 2.8%-5.8%) (Table 3). There was no significant trend in the use of NSAIDs for AORCs during the study period. Analgesic use increased from 18.3% in 2001 to 26.7% in 2005 ($P < .01$). The rate of prescription for DMARDs showed no clear pattern during the study period (Table 4).

The subgroup analysis, involving adult and elderly patients, for time trends yielded similar results. Among adult patients, the rate of prescription for analgesics increased from 16.5% in 2001 to 25.7% in 2005 ($P < .01$). Among elderly patients, the prescription trends were broadly similar to those among adult patients. However, in 2005, the prescription rate for analgesics increased to 28.4%, making it the most prescribed drug class among the elderly, overtaking the prescription rate for NSAIDs (27.6%) for that year (Table 4).

Significant differences were revealed when drug prescription rates were compared between age groups, by drug class, during the 5-year period. The present study found that the average prescription rate for NSAIDs for adult patients (35.1%) was higher than that for elderly patients (30.1%). Similarly, DMARDs were also found to be prescribed at a higher rate in adult patients (average prescription rate, 5.0%) than in elderly patients (average prescription rate, 3.0%). Alternatively, elderly patients were more likely to be prescribed a steroid (average prescription rate, 18.4% in elderly patients vs 14.1% in adult patients) or an analge-

sic (average prescription rate, 25.7% in elderly patients vs 22.3% in adult patients) (Table 3).

Discussion

In the present analysis of drug use trends, we observed an increasing trend in analgesic prescriptions from 2001 to 2005. A subgroup analysis of prescription trends on the basis of patient age revealed that NSAIDs and DMARDs are more frequently prescribed for adult patients, while steroids and analgesics are preferred for elderly patients. The findings of the study on the magnitude of ambulatory care visits for AORCs are consistent with those of a previous study by Hootman and colleagues [10]. Women had a rate of visits for AORCs that was 1.6 times higher than that for men, which is consistent with the high prevalence rates of AORCs among women [17]. White individuals account for the majority of visits, indicating possible racial disparities in access to health care, insurance coverage, and awareness of need for treatment. This finding is consistent with the general use of ambulatory medical services [18]. The proportion of women in the elderly group was higher than that in the adult group (67.9% vs 58.9%).

NSAIDs were the most prescribed drug class during the 5-year study period. Some fluctuations in the estimates of prescription rates for NSAIDs between the study years were observed, but they were not statistically significant. The NSAID prescription rate experienced a spike, from 31.0% in 2001 to 36.7% in 2003; the rate fell to 30.9% in 2005 (Table 4). The spike could be attributed to the increased use of the NSAID selective COX-2 inhibitors (coxibs) during that period, as coxibs claimed an increased safety profile, related to the adverse gastrointestinal events of NSAIDs [6].— The lower prescription rate in 2005 could be attributed to the reporting of cardiac adverse events and the subsequent withdrawal of coxibs from the market [5, 19].

Some previous studies that focused on specific conditions of AORCs have reported similar findings. One study that focused on osteoarthritis reported a 32.6% use rate for NSAIDs during 1995-1998 [7]. The average annual prescription rate for NSAIDs was 35.2% among the osteoarthritis subpopulation (data not shown). In the present study, 27% of all visits for AORCs included a primary diagnosis of osteoarthritis. NSAIDs are used widely in the treatment of osteoarthritis, so the high prescription rates for NSAIDs reflect their high rate of use in patients with osteoarthritis in the study population. Another study, which focused on rheumatoid arthritis, reported an increase in NSAID use from 1995 to 2002, and then a decrease from 2002 to 2004 [8].

In the early 2000s, numerous publications critically assessed the appropriateness of NSAIDs, in the wake of pharmacoepidemiological evidence of their adverse effects [20, 21]. This raised concerns about the use of NSAIDs, and as a result, physicians looked for alternatives. The significant increase in the prescription rate for analgesics may represent physicians' response to the publication of epide-

miological evidence on the risks associated with the use of NSAIDs. A definite pattern in the trend of DMARD use could not be determined, and their use was found to be the lowest, with an average prescription rate of nearly 4% of all visits for AORCs. DMARDs are recommended as the first-line agents for the treatment of rheumatoid arthritis [22, 23]. In the study population, only 6.4% of visits had a primary diagnosis of rheumatoid arthritis. In patients who received a primary diagnosis of rheumatoid arthritis, use of DMARDs was found to be 53.7% (data not shown). This is lower than the 72% use rate reported by Grijalva and colleagues [8] in 2004. However, they identified their patients on the basis of both rheumatoid arthritis ICD-9-CM codes and at least 1 prescription of DMARDs. Their sensitivity analysis, which identified patients on the basis of only rheumatoid arthritis diagnostic codes, as was the approach in the present study, yielded similar estimates (52% in 2004).

Significantly higher use of NSAIDs and DMARDs was

TABLE 4.
Medication Trends for Patients with Arthritis and Other Rheumatic Conditions (AORCs), 2001-2005

Medication, year	All patients	Adults (19-64 years)	Elderly (≥65 years)
NSAIDs			
2001	31.0 (26.0-35.9)	32.5 (26.7-38.2)	28.4 (21.3-35.5)
2002	34.9 (30.3-39.6)	35.3 (30.2-40.4)	34.4 (27.9-40.8)
2003	36.7 (31.8-41.6)	39.4 (33.3-45.6)	31.3 (24.5-38.1)
2004	33.6 (28.9-38.3)	36.2 (31.2-41.2)	29.1 (22.2-36.0)
2005	30.9 (26.0-35.7)	32.6 (27.7-37.5)	27.6 (19.4-35.8)
Analgesics			
2001	18.3 (14.8-21.8)	16.5 (12.8-20.1)	21.5 (15.0-27.9)
2002	23.5 (19.6-27.5)	22.1 (17.4-26.8)	25.8 (20.0-31.5)
2003	25.4 ^a (21.6-29.2)	23.2 ^a (17.5-28.9)	29.6 (23.7-35.5)
2004	23.7 (18.8-28.6)	23.8 (19.0-28.5)	23.5 (16.7-30.3)
2005	26.7 ^a (21.9-31.5)	25.7 ^a (20.8-30.7)	28.4 (21.9-35.0)
Steroids			
2001	14.9 (11.6-18.1)	12.9 (9.4-16.5)	18.1 (13.6-22.6)
2002	13.6 (10.0-17.2)	12.3 (8.6-16.1)	15.6 (11.2-20.0)
2003	15.6 (11.8-19.3)	13.7 (10.5-17.0)	19.1 (12.1-26.1)
2004	15.8 (12.1-19.5)	14.4 (10.2-18.6)	18.3 (11.5-25.0)
2005	18.0 (13.5-22.4)	16.5 (12.7-20.2)	20.8 (14.0-27.6)
DMARDs			
2001	4.3 (0.3-8.4)	5.3 (0.10.7)	...
2002	3.4 (1.0-5.9)	4.4 (1.1-7.7)	...
2003	5.5 (1.1-9.8)	6.5 (0.8-12.3)	...
2004	0.6 ^a (0.1-1.1)	...	...
2005	6.8 (3.3-10.2)	6.9 (3.3-10.5)	...

Note. Data are % (95% confidence interval). Figures represent percentages of the visits for AORCs (in the respective category) that resulted in a prescription. Cells without data represent an unweighted frequency <30%. Calculation of weighted estimates and percentages would be inappropriate, as they do not meet the National Center for Health Statistics criteria required for reliable estimation. DMARDs, disease-modifying antirheumatoid drugs; NSAIDs, nonsteroidal anti-inflammatory drugs.

^aStatistically significant at $\alpha = .05$, compared with 2001.

reported in adult patients than in elderly patients. These differences could be explained by an evidence-based response of providers to specific drug classes, in terms of their safety and efficacy in different age groups. A study by Fraenkel and colleagues [11] found that older patients with rheumatoid arthritis were less likely to receive aggressive DMARD treatment than were younger patients with rheumatoid arthritis. Tuntucu and colleagues [12] concluded that patients with elderly-onset rheumatoid arthritis (at >60 years) received biological treatment in combination with DMARDs less frequently than did patients with early-onset rheumatoid arthritis. Scmajuk and colleagues [24] also reported that older patients with rheumatoid arthritis were less likely to receive DMARDs, compared with younger patients. Some concerns have been documented in numerous studies of NSAIDs, also. Turajane and colleagues [25] reported that, with increasing age, risk of gastrointestinal and cardiovascular adverse events increases in patients with osteoarthritis of the knee. It is a well-documented fact that older patients are at a greater risk for gastrointestinal adverse events from NSAIDs, compared with younger patients [26]. This may influence physicians' perception with regard to use of NSAIDs in elderly patients. These factors might have played a role in the higher rate of analgesic and steroid prescriptions in elderly patients. When analgesic use was broken down into narcotic and nonnarcotic use, elderly patients were found to be more likely to receive nonnarcotic analgesics but less likely to receive narcotic analgesics, compared with adult patients (data not shown). Also, the elderly patients were diagnosed with osteoarthritis more often than were the adult patients (Table 2), which may explain the higher prescription rates for analgesics (Table 3) in this population, since acetaminophen is the first choice in osteoarthritis treatment.

The present study has several limitations. It included only patients with a primary diagnosis of AORCs, which could possibly lead to underestimation of total visits. Variations in patient record forms from 2001 to 2005 could lead to some discrepancy. For example, the NAMCS and the NHAMCS collected information on up to 6 medications in 2001 and on up to 8 medications during 2002-2005 that were prescribed at the end of a visit, including both a new and a continuing prescription. In 2005, a separate field was introduced to capture the presence of conditions such as arthritis, obesity, and hypertension; this field was not present in the earlier years. However, to enable standard comparison parameters, this field was excluded from the study. Since our main focus was on studying the drug prescription or use trends for AORCs, we studied only cases in which an AORC was the primary diagnosis. Although this would underestimate the prevalence of AORCs, the drug prescription trends would be more directly linked to the primary diagnosis.

The overall annual visit estimates reported in the present study are reliable and stable, according to the NCHS, because of sample size and standard error considerations.

However, extrapolation of national visits from small subsamples could create potential problems with regard to the reliability and confidence levels, such as with the use trend for DMARDs. Estimates from this survey of civilian, noninstitutionalized persons underestimate the number of visits for AORCs in the United States, since the NAMCS and NHAMCS sampling frames exclude federally employed physicians, federal military and Veteran's Administration hospitals, community health centers, and tertiary care centers. There can be underreporting of over-the-counter medications, especially NSAIDs and nonopioid analgesics. Also, because of the cross-sectional nature of the data, we could not address medication refills and medication compliance or persistence issues. The data collected in the NAMCS and the NHAMCS did not allow for identification of patients in remission. NCMJ

Rishi J. Desai, MS PhD candidate, Division of Pharmaceutical Outcomes and Policy, Eshelman School of Pharmacy, University of North Carolina-Chapel Hill, Chapel Hill, North Carolina.

Santosh J. Agarwal, BPharm, MS senior specialist, Healthcare Economics, Covidien, Mansfield, Massachusetts.

Rajender R. Aparasu, MPharm, PhD professor and division head, Department of Clinical Sciences and Administration, College of Pharmacy, University of Houston, Texas Medical Center, Houston, Texas.

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References

1. Arthritis basics. Centers for Disease Control and Prevention Web site. <http://www.cdc.gov/arthritis/basics.htm>. Accessed April 11, 2010.
2. Helmick CG, Felson DT, Lawrence RC, et al. Estimates of the prevalence of arthritis and other rheumatic conditions in the United States Part 1. *Arthritis Rheum*. 2008;58(1):15-25.
3. Yelin E, Murphy L, Cisternas MG, et al. Medical care expenditures and earnings losses among persons with arthritis and other rheumatic conditions in 2003, and comparisons with 1997. *Arthritis Rheum*. 2007;56(5):1397-1407.
4. NC Division of Public Health. North Carolina Arthritis Report 2002. <http://www.epi.state.nc.us/SCHS/pdf/arthritis.pdf>. Accessed April 22, 2011.
5. Guidelines for the management of rheumatoid arthritis: 2002 update. *Arthritis Rheum*. 2002; 46(2):328-346.
6. Schnitzer TJ. Update of ACR guidelines for osteoarthritis: role of the coxibs. *J Pain Symptom Manage*. 2002;23(4 Suppl):S24-30.
7. Ausiello JC, Stafford RS. Trends in medication use for osteoarthritis treatment. *J Rheumatol*. 2002;29(5):999-1005.
8. Grijalva CG, Chung CP, Stein CM, Mitchel EF Jr, Griffin MR. Changing patterns of medication use in the patients of rheumatoid arthritis in a Medicaid population. *Rheumatology*. 2008;47(7):1061-1064.
9. Khanna R, Smith MJ. Utilization and costs of medical service and prescription medications for rheumatoid arthritis among recipients covered by a state Medicaid program: a retrospective, cross-sectional, descriptive, database analysis. *Clin Ther*. 2007;29(11):2456-2467.
10. Hootman JM, Helmick CG, Schappert SM. Magnitude and characteristics of arthritis and other rheumatic conditions on ambulatory medical care visits, United States, 1997. *Arthritis Rheum*. 2002;47(6):571-581.
11. Fraenkel L, Rabidou N, Dhar R. Are rheumatologists' treatment decisions influenced by patients' age? *Rheumatology*. 2006;45(12):1555-1557.
12. Tutuncu Z, Reed G, Kremer J, Kavanaugh A. Do patients with older-onset rheumatoid arthritis receive less aggressive treatment? *Ann Rheum Dis*. 2006;65(9):1226-1229.

13. Alibhai SM, Krahn MD, Cohen MM, Fleshner NE, Tomlinson GA, Naglie G. Is there age bias in the treatment of localized prostate carcinoma? *Cancer*. 2004;100(1):72-81.
14. Gurwitz JH, Osganian V, Goldberg RJ, Chen ZY, Gore JM, Alpert JS. Diagnostic testing in acute myocardial infarction: does patient age influence utilization patterns? *Am J Epidemiol*. 1991;134(9):948-957.
15. National Center for Health Statistics. National Ambulatory Medical Care Survey. Hyattsville, MD: United States Department of Health and Human Services, National Center for Health Statistics. ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Dataset_Documentation/NAMCS/. Accessed April 22.
16. National Center for Health Statistics. National Hospital Ambulatory Medical Care Survey. Hyattsville, MD: United States Department of Health and Human Services, National Center for Health Statistics. ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Dataset_Documentation/NHAMCS/. Accessed April 22, 2011.
17. Hootman JM, Sniezek JE, Helmick CG. Women and arthritis: burden, impact and prevention programs. *J Women Health Gend Based Med*. 2002;11(5):407-416.
18. Schappert SM. Ambulatory care visits to physician offices, hospital outpatient departments, and emergency departments: United States, 1997. *Vital Health Stat* 13. 1999;143:i-iv, 1-39.
19. Hochberg M. Treatment of rheumatoid arthritis and osteoarthritis with COX-2 selective inhibitors: a managed care perspective. *Am J Manag Care*. 2002;8(17 Suppl):S502-S517.
20. Zhang W, Doherty M, Arden N, et al. EULAR evidence based recommendations for the management of hip osteoarthritis: report of a task force of the EULAR Standing Committee for International Clinical Studies Including Therapeutics (ESCISIT). *Ann Rheum Dis*. 2005;64(5):669-681.
21. Chan KA, Hernandez-Diaz S. Pharmacoepidemiology and rheumatic disorders. *Rheum Dis Clin N Am*. 2004;30(4):835-850.
22. Wolfe F, Cush JJ, O'Dell JR, et al. Consensus recommendations for the assessment and treatment of rheumatoid arthritis. *J Rheumatol*. 2001;28:1423-1430.
23. Verstappen SM, Jacobs JW, Bijlsma JW, et al. Utrecht Arthritis Cohort Study Group: Five year follow up of rheumatoid arthritis patients after early treatment with disease-modifying antirheumatic drugs versus treatment according to the pyramid approach in the first year. *Arthritis Rheum*. 2003;48(7):1797-1807.
24. Schmajuk G, Schneeweiss S, Katz JN, et al. Treatment of older adult patients diagnosed with rheumatoid arthritis: improved but not optimal. *Arthritis Rheum*. 2007;57(6):928-934.
25. Turajane T, Wongbunnak R, Patcharatrakul T, Ratansumawong K, Poigampetch Y, Songpatanasilp T. Gastrointestinal and cardiovascular risk of non-selective NSAIDs and COX-2 inhibitors in elderly patients with knee osteoarthritis. *J Med Assoc Thai*. 2009;92(Suppl 6):S19-S26.
26. Olivieri I, Palazzi C, Peruz G, Padula A. Management issues with elderly-onset rheumatoid arthritis: an update. *Drugs Aging*. 2005;22(10):809-822.



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