Gout in the Elderly — A Population Health Study

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ABSTRACT. ***Objective.*** To determine the incidence, healthcare utilization, and costs in older adults with gout.

Methods. A 5-year retrospective case-control study of patients with incident gout and matched controls was performed. Study variables were derived from health administrative data and included patient demographics, International Classification of Diseases diagnostic codes, and healthcare cost information.

Results. There were 4,071 cases and 16,281 controls, providing a 5-year incidence of gout of 4.4%. The mean (± SD) age (77 ± 7.3 and 76 ± 7.1 yrs) and the male:female ratio (1.0:1.04) were similar in both groups. Gout was diagnosed by family physicians (77%), nonrheumatology subspecialists (18%), general internists (4%), and rheumatologists (0.02%). Hospitalizations were significantly higher in cases ($p < 0.001$) in the year of diagnosis. Patients with gout had an average of 28.1 physician visits per year compared to 20.6 for controls ($p < 0.0001$). Drug utilization for the treatment (nonsteroidal antiinflammatory drugs, colchicine, corticosteroids) and prevention (allopurinol, probenecid, sulfinpyrazone) of gout was significantly higher ($p < 0.0001$). The average healthcare cost differential was +$134 (Cdn) per month ($p < 0.001$) and +$8,020 per case over 5 years. These costs were due to hospital utilization (64.4%), medications (23.1%), and physician visits (12.5%).

Conclusion. Gout is associated with a high disease burden in older men and women. The cost is primarily attributable to hospitalization, probably due to the comorbidities associated with gout. As the majority of cases are managed by nonrheumatologists, it is important that guidelines for the diagnosis and treatment of gout are disseminated to and met by all physician groups. (J Rheumatol First Release March 15 2009; doi:10.3899/jrheum.080768)

Key Indexing Terms:
GOUT HEALTH ECONOMICS HEALTH CARE UTILIZATION ELDERLY

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Gout is a common medical problem, occurring in up to 1% of individuals in Western countries, with a male predominance of 4:1[1]. The prevalence of gout is increasing[1-3], especially in the elderly[1], where the male predominance becomes less marked[1]. Gout is increasing as a result of gout-promoting lifestyle choices such as increased use of high purine diets, metabolic syndrome, obesity, longevity, and hyperlipidemia[4,5] and a number of age-related risk factors including an increase in the prevalence of renal failure and diuretic-treated hypertension[2,3]. Recipients of organ transplants also have an increased risk of gout due to use of cyclosporine and other antirejection drugs[6].

The diagnosis and treatment of gout has changed relatively little over the past 20 years and there is general agreement on the therapeutic approach[7-9]. Despite consensus on the diagnosis and treatment, gout is frequently misdiagnosed and inappropriately managed[10,11] by both primary care physicians and medical or surgical specialists. This may lead to significant pain from joint inflammation and joint damage, use of potentially toxic medications, avoidable visits to hospital emergency rooms, and unnecessary hospital admissions, all of which consume limited healthcare resources.

Patients seen by rheumatologists represent only a minority of the total number affected by gout. Thus, in order to

determine the true burden of the disease, particularly in the elderly, it is necessary to look beyond rheumatology subspecialty care. We have utilized a population health approach to comprehensively examine the diagnosis and treatment of new cases of gout in patients 65 years of age and older. Our specific objectives were to identify the different physician groups involved in their care, the medications prescribed, and overall healthcare utilization and costs.

MATERIALS AND METHODS

Study methodology. This was a retrospective case-control study of patients with a new diagnosis of gout within the Nova Scotia Medical Services Insurance (MSI) program. Nova Scotia is a Canadian province of approximately 1 million inhabitants. There are 2,458 physicians in Nova Scotia, of which 1,227 work in primary care, 193 are general internists, and 11 are adult rheumatologists. Healthcare services including acute hospitalizations and ambulatory physician visits are universally provided as specified under the Canadian Health Act. Pharmaceuticals outside of hospitals are provided by a variety of methods including provincial public drug insurance programs[12]. The eligible population was limited to individuals aged 65 years and older with at least 12 months' enrollment in the Nova Scotia Seniors Pharmacare Program (NSSPP). The NSSPP subsidizes the cost of medications for those residents age 65 years and older who do not already have private prescription drug coverage or who are not covered by other federal private prescription drug plans such as Veterans Affairs Canada or First Nations and Inuit Health Services. The NSSPP provides drug coverage to about 85% of seniors in Nova Scotia. Patients with gout were matched one to 4 by age and sex to a control cohort of patients without a diagnosis of gout over the same time period, namely fiscal years April 1, 2001, through March 31, 2006.

The data were obtained from existing databases accessed through the Population Health Research Unit (PHRU) in the Department of Community Health and Epidemiology, Dalhousie University, Halifax, Nova Scotia. Within this unit there are secure research computing facilities and access to data is governed by PHRU data access guidelines and procedures.

The study protocol was reviewed and approved by the Capital Health Research Ethics Board. Informed consent from individual patients was not required as the study utilized administrative data.

Cohort selection and validation. The gout cohort consisted of all incident cases diagnosed during the fiscal years April 1, 2001, through March 31, 2006. In order to be included in the incident-gout cohort it was necessary to have had no diagnosis of gout from April 1, 1995, to the index date. The *International Classification of Diseases*, 9th edition [ICD-9 (274) and ICD-10 (M10)] diagnostic codes for gout were used to identify incident cases. The control cohort was derived by random selection of individuals in the Nova Scotia Pharmacare Program that were not given a diagnosis of gout from April 1, 1995, to March 31, 2006. All patients who fulfilled criteria for eligibility rather than utilization of Pharmacare services were considered in order to identify an unselected population of older adults. For each case there were 4 controls selected at random but matched for age and sex. To calculate rates of exposure to certain gout-predisposing drugs such as diuretics prior to the incident diagnosis, all individuals included in the gout and control cohorts required 12 months of Pharmacare eligibility prior to the index date.

To determine the validity of the diagnosis of gout in the administrative databases, a subset of patients with a new diagnosis of gout made by a nonrheumatologist, but who had also been seen by a rheumatologist for any reason over the same 5-year period, was identified. These patients and age/sex-matched non-gout controls were cross-referenced with physician billings from rheumatology ambulatory clinic visits at The Arthritis Centre of Nova Scotia. The same group was cross-referenced with hospital admissions to medical and surgical units at the Queen Elizabeth II Health Sciences Centre, Halifax, when a rheumatological consultation was requested and performed. In both the ambulatory and inpatient groups a diagnosis of gout by the rheumatologist was taken as the gold standard.

Data collection. Individual-level data were obtained. Computerized claims for seniors (age ≥ 65 yrs) within the NSSPP were linked by encrypted health-card number to the Canadian Institute of Health Information (CIHI) Hospital Discharge Abstracts and MSI Physician Billings for fiscal years April 1, 1995, to March 31, 2006. Encrypted identifiers for individual patients were used to ensure patient confidentiality. The NSSPP database contains demographic information, costs of medications and dispensing fees, World Health Organization Anatomical Therapeutic Classification (ATC) codes, and Health Canada Drug Identification Numbers (DIN). Information on the utilization of the following groups of medications with the following indications or pharmacologic effects was obtained; acute gout: nonsteroidal antiinflammatory drugs (NSAID), colchicine and corticosteroids; urate-lowering drugs: allopurinol, probenecid and sulfinpyrazone; selected drugs causing hyperuricemia: diuretics, ethambutol, insulin, ASA; treatment of comorbid conditions: beta-blockers, angiotensin-converting enzyme (ACE) inhibitors/angiotensin receptor blockers (ARB), calcium-channel blockers; and gastroprotective agents: histamine-2 receptor antagonists, proton-pump inhibitors, misoprostol. ATC codes were identified by reviewing the ATC index (http://www.whocc.no/) and the Nova Scotia Formulary (http://www.gov.ns.ca/health/pharmacare/) for the relevant study years.

Study variables. Patient demographic data, ICD-9 (274) and ICD-10 (M10) diagnostic codes, and cost information were extracted from the NSSPP database, CIHI hospital discharge abstracts, MSI Physician Billings, and the MSI patient registry for the period April 1, 2001, to March 31, 2006. Followup of subjects ended either after death or at end of the observation period or termination of MSI eligibility up to March 31, 2006.

Associated costs of outcomes. The cost of healthcare utilization in the gout and control incidence cohorts was estimated for physician claims, hospital admissions and ambulatory visits, and Pharmacare prescriptions. Physician costs were based on the MSI fee schedule and Pharmacare costs were based on the approved drug cost, including patient copayments. As the CIHI hospital database did not include cost estimates, hospital costs were derived from 2005/06 Ontario Case Cost Initiative (OCCI) estimates of average case costs, including direct patient costs as well as indirect costs including overhead and administration (Ontario Case Costing Initiative: http://occp.com). The cost of gout-related diagnosis was based on the average of all OCCI hospital admissions or ambulatory visits with a diagnosis of gout. The costs of non-gout admissions were based on the combined average of OCCI case costs for the top 50 diagnoses by volume for all patients aged ≥ 70 years. All costs are reported in 2005/06 Canadian dollars and were adjusted for inflation using the Statistics Canada Consumer Price Index, health and personal care component[13].

To account for censoring of cost data due to differing lengths of patient followup in the incidence cohorts, average patient costs were calculated for each month from the incident diagnosis (index month). Over the 5-year study period, this allowed up to 60 observations per case or control, although the number of observations included in the calculation of the monthly average healthcare costs declined over the study period as patients were censored. The overall average net cost differential associated with gout was calculated as the average cost of all healthcare utilization for cases in a particular month, less the average cost of all healthcare utilization for controls in the same month. This calculation was repeated for each of the components of overall healthcare utilization (physician, hospital, and Pharmacare).

Statistical analysis. The data were analyzed with SAS v9.1 software (SAS Institute Inc., Cary, NC, USA). Descriptive statistics were used to characterize the study and control cohorts and variables included age, sex, number of ambulatory visits, emergency room visits and hospitalizations, diagnosing physician groups, and use of medication. The incident cases of gout were analyzed for medication use at the time of diagnosis and over the

duration of observation with adjustment for length of observation. Medication use (percentage of population) and 95% confidence intervals were estimated. The sensitivity, specificity, and positive and negative predictive value of the administrative data for the diagnosis of gout were determined using physician billing following rheumatology consultation as the gold standard, and the extent of agreement was expressed by simple kappa coefficient (0.01–0.2 indicates slight agreement, 0.21–0.4 fair, 0.41–0.6 moderate, 0.61–0.8 substantial agreement, and 0.81–0.99 almost perfect agreement)[14]. The statistical significance of the overall cost differential was tested using the t-statistic of the monthly cost differentials. Trends in the cost differential were analyzed in an ordinary least-squares model, regressing the monthly cost difference against index month.

RESULTS

Patients and diagnosis of gout. A total of 4,071 incident cases of gout were identified and matched to 16,281 controls. Based on a mid-period Pharmacare population of 92,089 seniors, the 5-year incident rate was 4.4%. The mean (± SD) age of cases was 77 ± 7.3 and of controls 76 ± 7.1 years, with a comparable representation of cases and controls in different age groups (Figure 1). The proportion of male/female was identical for both cases and controls (51% female, 49% male).

One hundred twenty-nine cases and 178 controls were available to determine the accuracy of the administrative data for the diagnosis of gout. The sensitivity of the administrative data for identifying patients with gout was 100%, the specificity 72%, and the positive and negative predictive values 46% and 100%, respectively. The kappa coefficient was 0.49, indicating moderate agreement. In those patients who were incorrectly identified as having gout in the administrative data, the correct diagnoses were osteoarthritis (27%), rheumatoid arthritis (27%), non-gout crystal arthropathies (23%), polymyalgia rheumatica (9%), primary Sjögren's syndrome (9%), seronegative inflammatory arthritis (9%), and other rheumatic diseases (2%).

The majority of incident cases of gout (77%) were diagnosed by family physicians, followed by general internists (4%) and rheumatologists (0.02%). The remaining 18% of cases were diagnosed by other subspecialty physicians. Within each of the 5 years of the study there was a similar number of cases of gout diagnosed by the individual physician groups.

Physician visits and hospital contacts. The overall physician contact rate, including office, home, or emergency room contacts, was comparable between cases and controls over the 5-year period of study (Figure 2A). All the cases and most of the controls had an encounter with a physician in the index year of the study, with a slight reduction in the physician contact rate over the ensuing 4 years of followup. There was no statistically significant difference in rates of physician contact between the cases and controls. Of interest, the hospital contact rate, representing inpatient admission and/or day surgeries, was significantly higher in cases ($p < 0.001$) than in controls in the index year, but not in subsequent years of followup (Figure 2B).

Physician specialty and patient contacts. The total number of visits to each physician group in the year of diagnosis and over the subsequent 4 years of followup is illustrated for patients with gout (Figure 3A) and controls (Figure 3B). Over the 5-year period of study 4,071 patients with gout had 215,946 physician visits, the majority of which were with family physicians, and the minority of visits was to rheumatologists. Similarly, 16,281 control patients had 1,021,911 physician visits. Adjusted for duration of followup, each case had an average of 28.1 physician visits per year com-

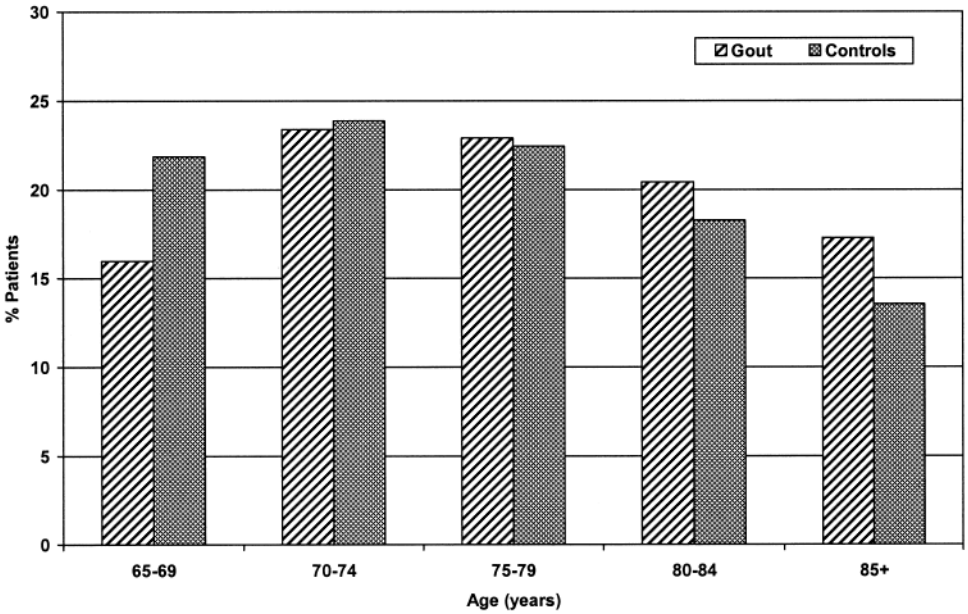

Figure 1. The proportion of incident cases of gout (n = 4,071) and controls (n = 16,281) in different 5-year age categories between 65 and 85+ years.

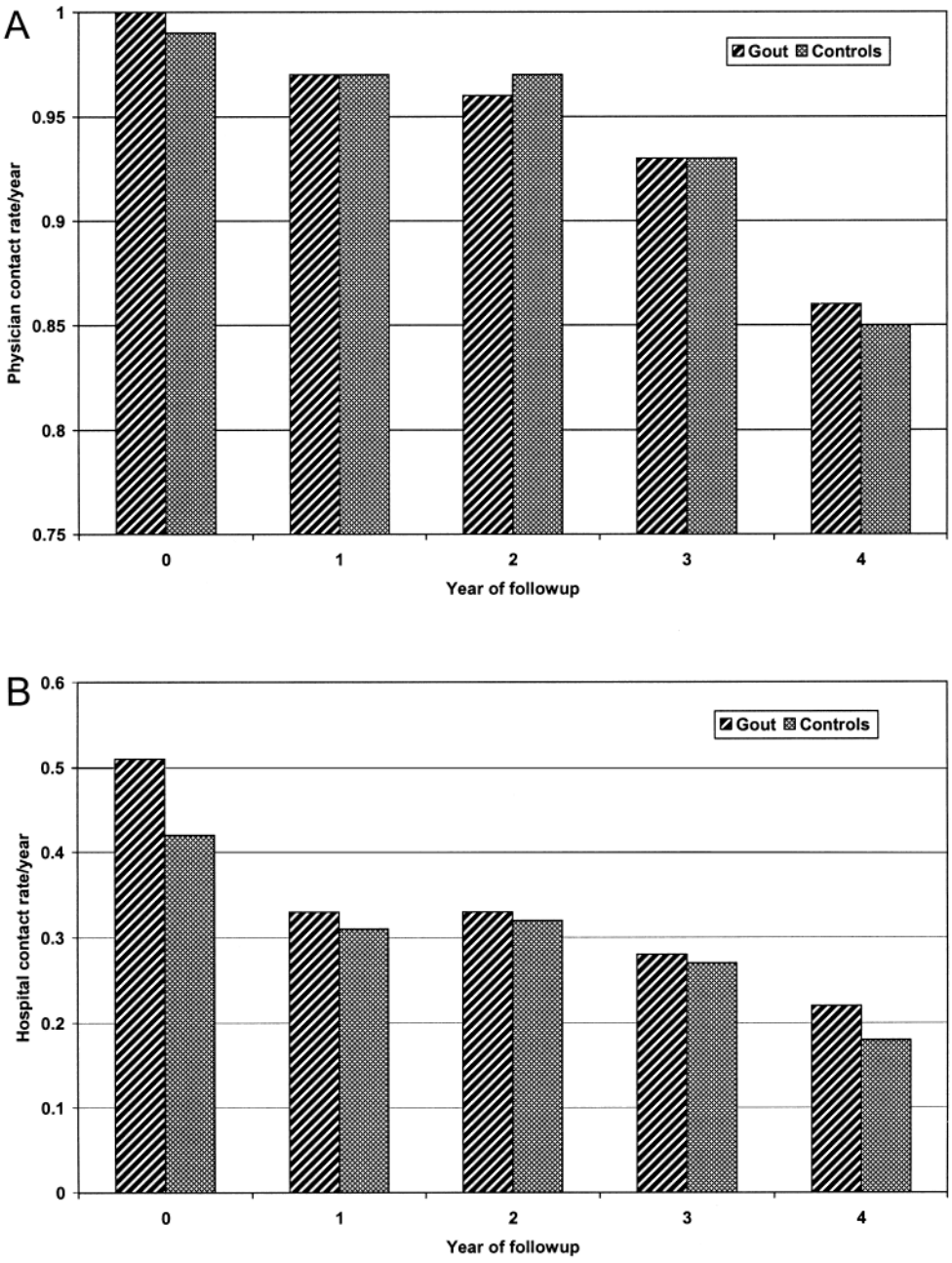

Figure 2. Overall physician contact rates/year (A) and hospital contact rates/year (B) for patients with incident gout since diagnosis and controls over 5 years. Utilization was for any diagnosis and was not confined to gout.

pared to 20.6 physician visits per patient per year for controls ($p < 0.0001$). Although there was some variability in the pattern of physician visits between cases and controls in individual years of the study, the proportion of visits to family physicians (66% vs 63%), general internists (9% vs 8%), other physicians (25% vs 30%), and rheumatologists (0.2% vs 0.1%) was comparable ($p > 0.05$).

Medication utilization. The utilization rate of medications for patients with gout and controls is summarized in Table 1. The rates represent individuals with at least one prescription for a particular drug class within a defined period relative to the incident diagnosis. As the maximum days supply dispensed through the NSSPP is 100 days, a defined period relevant to the incident diagnosis for medications was set at 110 days. Drug utilization assessed according to medical indication was significantly different and appropriate for both the treatment (NSAID, colchicine, corticosteroids) and prevention (allopurinol, probenecid, sulfinpyrazone) of acute and chronic tophaceous gout. The utilization of medications with the ability to elevate blood urate concentra-

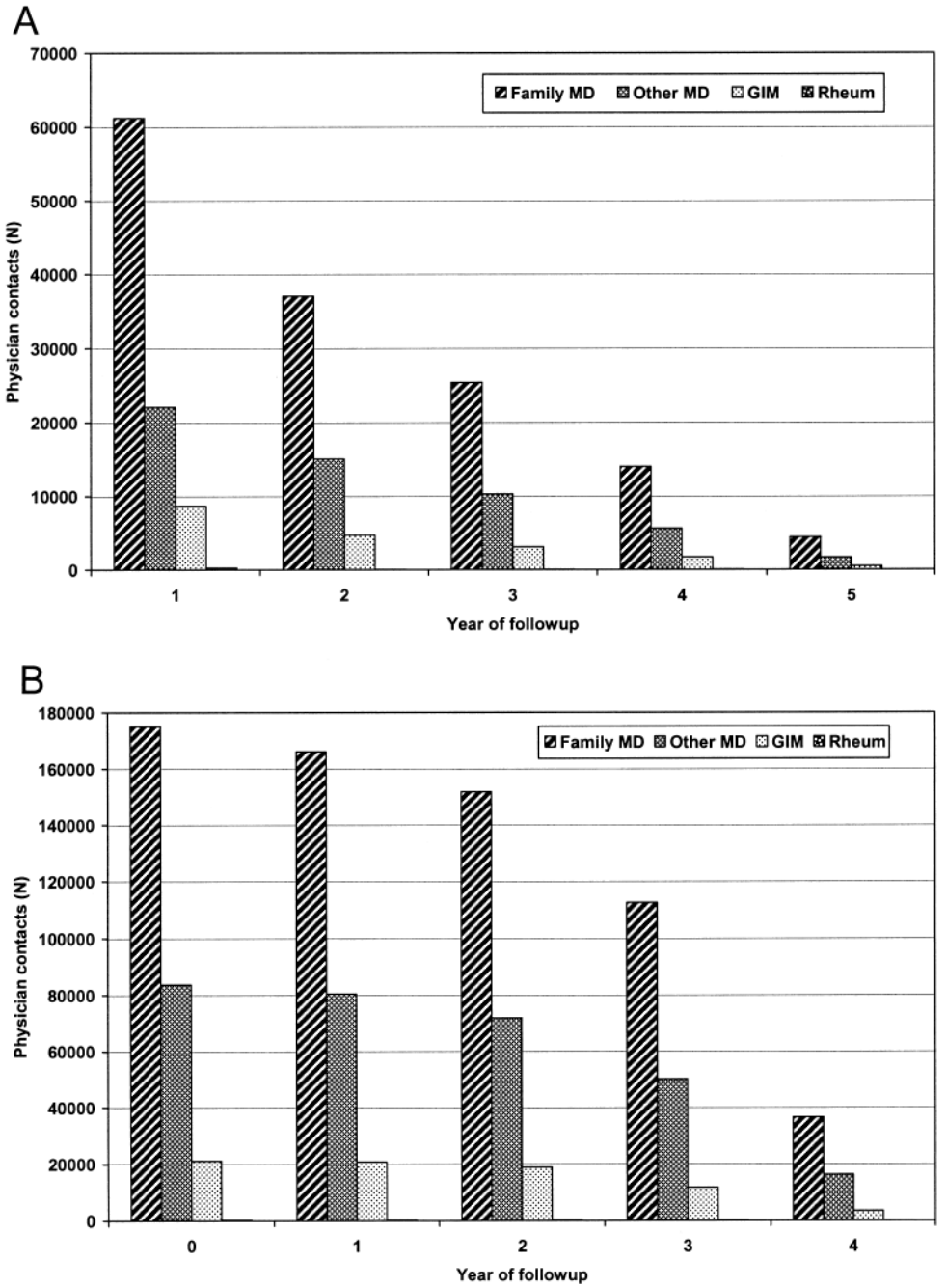

Figure 3. Absolute number of physician contacts for patients with incident gout since diagnosis (A) and controls (B) over 5 years. Utilization was for any diagnosis and was not confined to gout. GIM: general internal medicine.

tions was significantly higher in cases than controls for 2 of 4 agents selected (diuretics and insulin). Similarly, the utilization of medications used for treatment of potential comorbidities was significantly higher in the 3 agents selected (beta-blockers, ACE inhibitors/ARB, and calcium-channel blockers). Other findings of interest included a significantly higher utilization of H_2-blockers, proton-pump inhibitors, and misoprostol in patients with gout, which is likely due to the higher utilization of NSAID in this elderly population.

Health economics. The gout cohort was associated with an average overall healthcare cost differential of +$134 per month ($p < 0.001$), although the trend analysis confirmed this cost differential had largely disappeared 5 years from the incident diagnosis of gout (Figure 4). The average cost differential over the entire 5-year study period was +$8,020

Table 1. Medication prescriptions in incident cases of gout and controls over 5 years. Combination therapy was not investigated.

Drug	Period	No. of Cases	Rate, % (95% CI, %)	No. of Controls	Rate, % (95% CI, %)	p
Drugs for acute gout						
NSAID***	110 days post-Dx	2165	53.18 (51.65–54.71)	2654	16.30 (15.73–16.87)	< 0.0001
Colchicine*	110 days post-Dx	1094	26.87 (25.51–28.24)	—	0.00 —	< 0.0001
Corticosteroid***	110 days post-Dx	486	11.94 (10.94–12.93)	845	5.19 (4.85–5.53)	< 0.0001
Urate-lowering drugs						
Allopurinol	Ever	1435	35.25 (33.78–36.72)	—	0.00 —	< 0.0001
Probenicid	Ever	27	0.66 (0.41–0.91)	—	0.00 —	< 0.0001
Sulfinpyrazone	Ever	12	0.29 (0.13–0.46)	—	0.00 —	< 0.0001
Selected drugs causing hyperuricemia						
Diuretics	1 yr pre-Dx	2236	54.93 (53.40–56.45)	4898	30.08 (29.38–30.79)	< 0.0001
Ethambutol	1 yr pre-Dx	1	0.02 (–0.02–0.07)	1	0.01 (–0.01–0.02)	0.2889
Insulin	1 yr pre-Dx	197	4.84 (4.18–5.50)	433	2.66 (2.41–2.91)	< 0.0001
ASA†	1 yr pre-Dx	39	0.96 (0.66–1.26)	122	0.75 (0.62–0.88)	0.1789
Drugs for comorbidities						
Beta-blocker	1 yr pre-Dx	1719	42.23 (40.71–43.74)	4657	28.60 (27.91–29.30)	< 0.0001
ACE/ARB††	1 yr pre-Dx	2051	50.38 (48.84–51.92)	5412	33.24 (32.52–33.96)	< 0.0001
Calcium Channel Blocker	1 yr pre-Dx	1195	29.35 (27.95–30.75)	3762	23.11 (22.46–23.75)	< 0.0001
Gastroprotective agents						
H_2 receptor antagonist	1 yr pre-Dx	1094	26.87 (25.51–28.24)	3534	21.71 (21.07–22.34)	< 0.0001
Proton-pump inhibitor	1 yr pre-Dx	374	9.19 (8.30–10.07)	1012	6.22 (5.84–6.59)	< 0.0001
Misoprostol	1 yr pre-Dx	150	3.68 (3.11–4.26)	255	1.57 (1.38–1.76)	< 0.0001

* Small doses may also be used for prophylaxis. ** NSAID: nonsteroidal antiinflammatory drugs were usually naproxen, sulindac, indomethacin, or celecoxib. *** Prednisone, methylprednisolone, or triamcinolone usually used. † Since ASA is a nonprescription medication, many patients likely obtained it without a prescription. †† ACE/ARB: angiotensin-converting enzyme inhibitor/angiotensin receptor blocker.

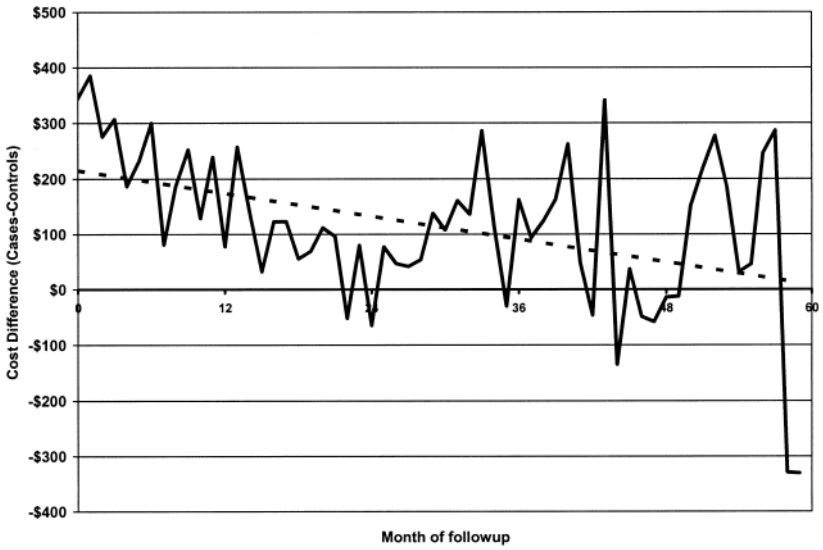

Figure 4. Mean overall healthcare cost differential between patients with incident gout since diagnosis and controls over 5 years.

per gout case. Hospital utilization was the key cost driver, accounting for an average of 64.4% of monthly healthcare costs in the gout cohort and 64.6% in the control cohort over the 5-year study period. The relative contribution of Pharmacare utilization was 23.1% and 22.4% in the case and control cohorts, respectively, with physician utilization accounting for the remaining 12.5% and 12.9% of overall costs in the case and control cohorts.

The relative consumption of healthcare resources is shown in Figure 5 by plotting the proportion of total healthcare costs by the proportion of the cases and controls (Lorenz curves). If resource consumption was evenly dis-

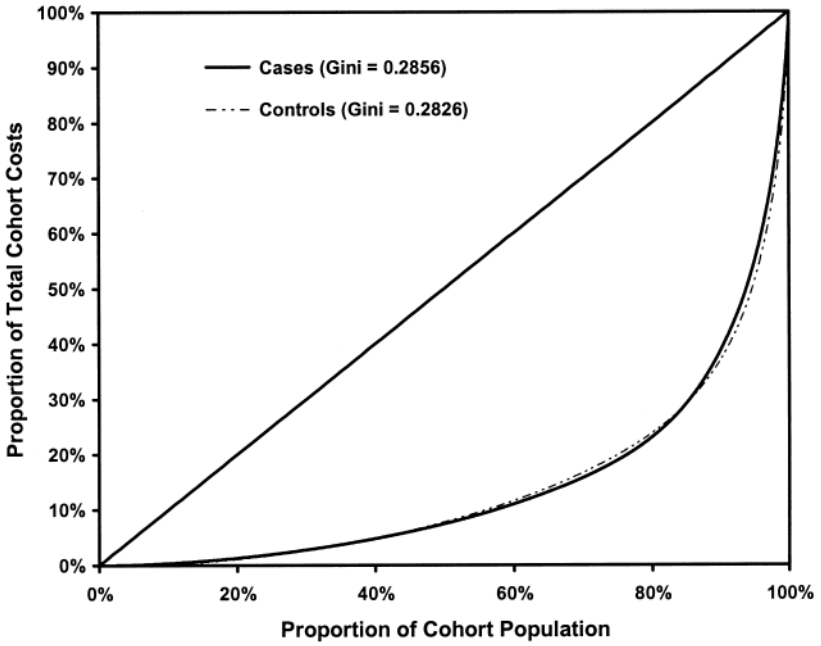

Figure 5. Consumption of healthcare resources in the first year since diagnosis of gout is illustrated by Lorenz curves that plot the proportion of total healthcare costs against the proportion of cases and controls. Roughly 80% of both cohorts accounted for only 20% of total healthcare costs, while the remaining 20% accounted for 80% of total costs. The Gini coefficients represent the ratio of the area under each curve to the area under the 45° diagonal. If resource consumption was evenly distributed across all individuals in the cohort, the curve would follow the 45° diagonal and have a Gini coefficient of 1.0.

tributed across all individuals in the cohort, the Lorenz curve would follow the 45° diagonal. Instead, the Lorenz curves showed that roughly 80% of both cohorts accounted for only 20% of total healthcare costs, while the remaining 20% accounted for 80% of total costs. Thus, the pattern of healthcare utilization was comparable between the cases and controls. While the Lorenz curves demonstrated that relative healthcare utilization (i.e., the proportion of high and low utilizers) was very similar between the 2 cohorts, the absolute utilization was higher in the gout cohort.

DISCUSSION

Gout has been a recognized medical illness for at least 4000 years[7]. The pathogenetic mechanisms and treatment options are well established[7,9,15-18], despite the lack of placebo-controlled randomized clinical trials[17]. The frequency of gout is increasing in both outpatient clinics and inpatient hospital units.

We identified all incident cases of gout in a well defined elderly population. Our findings indicate that incident cases of gout are frequent in both older men and women and that the majority of patients are diagnosed and treated without input from rheumatologists. These patients have a high utilization of healthcare resources that is likely due in part to the multiple comorbidities that accompany the disease.

Administrative data were used to address the questions posed in this study. Residents of Nova Scotia aged ≥ 65 years are provided coverage for all their healthcare needs by a single government-funded provider. Thus the delivery of medical care, including all diagnostic and therapeutic interventions for gout, can be examined in a comprehensive manner. As the majority of new cases were diagnosed by non-rheumatologists, we attempted to validate the diagnosis of gout in the cohort using the rheumatologist's diagnosis as the gold standard[19]. The level of agreement between non-rheumatologists and rheumatologists was in keeping with that reported previously using administrative databases for the study of gout[19] and other rheumatic diseases[20-22].

The overall incidence of gout in our population was 4.4%, which equates to 0.88% per year. This is higher than the annualized incidence of 0.53% in a cohort of 5,942 patients reported by Sarawate, *et al*[23], although the mean age of their cases was 57 ± 14 years, considerably younger than our patients. In another population health study of gout in older adults[1], the prevalence was roughly 6.0% for patients in the 65–74 age group. The male predominance is reflected in all epidemiologic studies of gout. This sex difference decreases with age to as low as 3:1 in individuals over the age of 75 years[1,24] and 2:1 in those 80 years of age or older[24]. In our study the frequency of gout was comparable in both men and women.

The overall disease burden attributable to gout is sub-

stantial, as reflected not just by the absolute and increasing number of patients with the disease but also by the impact on health-related quality of life (HRQOL) and productivity in the workplace. The negative influence on HRQOL is attributable to both the direct musculoskeletal manifestations[25] and associated comorbidities that include the metabolic syndrome, renal failure, and cardiovascular and cerebrovascular disease[25]. A recent population health study of about 300,000 employees in the United States also indicated a substantial effect on work absence and productivity[26]. Many of the articular and associated comorbidities are reversible with appropriate therapy, such as the judicious use of urate-lowering agents. This may explain why, in our study, the significantly high financial cost associated with gout in the first year of diagnosis disappeared over the 4 years of followup. A recent study by Wu, *et al* also found that older US adults with gout have higher healthcare costs compared to matched controls and that most of this is due to the associated comorbidities[4].

Despite a relative paucity of controlled clinical trials evaluating different therapies for gout[17,27,28], there is a general consensus among rheumatologists on the correct management as reflected by the high concordance between published treatment guidelines and quality of care indicators[16,29,30]. The same is true of what is known about medications that can potentially exacerbate gout through either elevating or lowering serum levels of uric acid[24]. In our study, the differences in drug utilization between gout and control patients is what one would predict and thereby provides further verification of the population cohorts. Thus it not surprising that over 90% of patients with gout received at least one antiinflammatory agent compared to 21% of controls. Similarly, the proportion of cases receiving allopurinol is comparable to that previously reported in population cohorts of gout[19,31] and is in striking contrast to no use of allopurinol in any of the 16,281 controls. However, our study was not designed to determine other critical factors such as whether the appropriate patients with gout were receiving allopurinol, if the dose was adjusted for comorbidities such as renal impairment, and whether the efficacy was confirmed by targeting a specific level of uric acid and titrating the dose of allopurional accordingly in individual patients. The use of H_2-blockers, proton-pump inhibitors, and misoprostol could reflect a proactive strategy to prevent NSAID gastropathy or a treatment response to a complication that has already occurred. Gout-specific medications are one of the fastest growing therapeutic classes in Canada, which requires additional urgency in ensuring their correct utilization for both efficacy and avoidance of unwanted toxicities, especially in this vulnerable, elderly population[17].

Recent studies have raised concern about the lack of adherence to diagnostic and treatment guidelines for gout[32-34]. This is particularly troubling in light of the well accepted diagnostic gold standards and treatment strategies that should make gout a curable disease in the majority of cases. Some have suggested that the disease does not receive sufficient attention and respect from healthcare providers, including rheumatologists[33]. Management of gout is frequently delegated almost exclusively to primary care physicians, which is in contrast to the pivotal role of rheumatologists in both the early detection and longterm treatment of other inflammatory arthropathies such as rheumatoid arthritis[33,35]. There are substantial risks associated with both inadequate and inappropriate or excessive treatment of gout. The latter is a particular concern in the elderly, who carry the highest risk of drug toxicity[17].

A number of limitations to our study should be considered. First, the accuracy of administrative data for ascertainment of diagnostic information on gout is often a concern[19]. The gold standard for diagnosing gout is the identification of intracellular urate crystals in joint fluid aspirated from an inflamed joint or tophus. Although ideal, this is not always an attainable goal even in hospitalized patients in whom microscopic examination of synovial fluid may only be obtained in as few as 25% of cases[34]. In rheumatologic clinical practice, it is also not unusual to have to make a diagnosis of gout in the absence of such information. Second, in accord with privacy and confidentiality guidelines at our institution we were unable to match individual cases to their specific individual controls. Rather, the total control cohort matched the overall age-sex structure of the case cohort on a 4:1 basis. Third, we did not have access to detailed clinical information, such as the results of synovial fluid aspirates submitted for urate crystal determination and the ability to confirm if patients were appropriately treated and monitored after the diagnosis of gout. Finally, we were unable to determine the precise reasons for the observed high economic costs associated with gout in the year of diagnosis. It would have been of interest to determine if that was due to gout per se or the associated comorbidities. However, accurate information on comorbidities is difficult to acquire from administrative healthcare databases. In addition, our specific objective was to determine if a diagnosis of gout in older adults was associated with increased healthcare utilization compared to age and sex-matched controls without gout.

Despite these limitations, our study indicates the high disease burden associated with gout in elderly male and female patients. Very likely this translates into poor HRQOL in addition to the demonstrated higher healthcare utilization and expenditures. Future studies should focus on reducing the care gap that currently exists in the management of gout, by ensuring that what is known about the diagnosis and treatment of this common rheumatic disease is translated into improvements in quality of care for affected individuals.

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