Poor Validation of Medical Record ICD-9 Diagnoses of Gout in a Veterans Affairs Database

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ABSTRACT. ***Objective.*** Diagnostic codes based on medical records or claims data have been used to identify patient populations with gout for important epidemiologic and clinical studies. We evaluated whether we can document the accuracy of such diagnoses by review of medical records and then on direct interviews with a subset of patients.

Methods. Electronic medical records of 289 patients with 2 visits with ICD-9 codes for gout were extensively reviewed to search for documentation of features that would classify patients as having gout by 3 sets of proposed criteria, the American College of Rheumatology (ACR), New York, or Rome criteria. Records of patients who had been seen by rheumatologists were compared with all others. A subset of patients seen in clinic were directly interviewed for comparison with the results from the records.

Results. Based on medical records review there was documentation of gout by the ACR criteria in only 36%, Rome criteria in 30%, and New York criteria in 33%. Records of patients who had seen rheumatologists had better documentation of classification features. Interview in clinic of 37 patients also improved documentation of the 3 sets of criteria features of gout in 65%–81% of those with ICD-9 codes for gout.

Conclusion. We found it difficult to confirm ICD-9 coded diagnoses of gout using currently available proposed criteria from details recorded in medical records. This may reflect a problem with available criteria and with documentation. Direct interview of patients may be needed to confirm the presence of typical features when high specificity is desired. (First Release May 15 2009; J Rheumatol 2009;36:1283–6; doi:10.3899/jrheum.081195)

Key Indexing Terms:
DIAGNOSES GOUT EPIDEMIOLOGIC STUDIES

Identification of patient populations for clinical and epidemiologic studies can be challenging. The prevalence of gout in populations can be estimated in several ways. Patient self-report has been used[1], but subsequent evaluation revealed that only 44% of these diagnoses could be validated using existing criteria for gout[2]. More recent publications estimated the prevalence and incidence of gout using diagnostic codes from electronic medical records (EMR) or administrative databases[3]. While such data are a potentially powerful tool for clinical research, the usefulness of these data from codes such as the *International Classification of Diseases*, 9th ed. (ICD-9) has received little validation of the potential cases using currently available proposed criteria. One recent publication evaluated the validity of gout diagnoses in health maintenance organization administrative data compared with the "gold standard" of physician global assessment. The positive predictive value of ICD-9 diagnoses was between 61% and 67%[3].

Since the diagnosis of gout is often made on clinical grounds by nonrheumatologists there is a concern whether patients with ICD-9 diagnoses of gout can actually be confirmed to have gout. We analyzed whether examination of the electronic medical records will confirm a gout diagnosis using the published American College of Rheumatology (ACR), Rome, and New York criteria in the setting of a large university affiliated US Department of Veterans Affairs (VA) medical center.

MATERIALS AND METHODS

The Institutional Review Board at the Philadelphia VA Medical Center (VAMC) approved this study. To select records for review, we utilized existing national databases maintained by the US Veterans Health Administration. These databases include the National Patient Care Database (i.e., both inpatient and outpatient records) and the Pharmacy Benefits Management Database and the Clinical and Administrative database (VISTA) that are linked using scrambled social security numbers and other identifiers. These databases were queried to identify patients who had 2 ICD-9 coded encounters with a provider for gout between October 1, 1998, and September 30, 2004. The ICD-9 codes that were queried for were

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Supported in part by an Investigator Initiated grant from TAP Pharmaceuticals.

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Accepted for publication January 30, 2009.

274.X for any aspects of gout. Similar to previous studies, 2 outpatient visits for gout, or a combination of an inpatient admission with an outpatient visit, were used to select the study population[4,5].

Complete EMR of 289 consecutive patients from these databases who had been seen at the Philadelphia VAMC were reviewed in detail from the beginning of the electronic chart in 1997 to the present. Two chart reviewers trained in medical record abstraction, one physician and one trained research assistant, reviewed all records. The charts were carefully reviewed for documentation of any features of the ACR (American Rheumatism Association) 1977 Preliminary criteria[6] or New York[7] or Rome[8] criteria for the classification or diagnosis of gouty arthritis (Table 1). All healthcare encounters, regardless of diagnosis or reason for visit, medication lists, laboratory reports, and radiology studies were reviewed to identify evidence that supported criteria for the diagnosis of gout. A standardized data collection form was used to extract documentation for the features of the 3 sets of clinical criteria for gout (Table 1). Charts we studied were from 287 men and 2 women. Mean age was 73.6 years (range 42–93 yrs). One hundred twenty-five were African American, 110 Caucasian, 48 unspecified, 3 Pacific Islander or Hawaiian, 2 Hispanic, and 1 Asian.

To help distinguish between poor documentation and incorrect diagnosis we directly interviewed a subset of 37 patients, whose EMR had been reviewed, during outpatient rheumatology visits between 2005 and 2006. The results of direct questioning were then compared with the results from the records review.

Statistical analysis. Descriptive statistics were used to summarize the sociodemographic and clinical characteristics of the patients with a presumptive diagnosis of gout based on ICD-9 codes whose charts were reviewed. The chi-square statistic was used to compare the proportions of patients seen only by primary care providers that met ACR, Rome, or New York criteria to those seen by rheumatologists.

Table 1. Criteria for the diagnosis or classification of gout.

American College of Rheumatology (American Rheumatism Association) Preliminary Criteria for the Classification of the Acute Arthritis of Primary Gout[6]

Monosodium urate crystals in synovial fluid or tophus
or presence of at least 6 of the following
1. More than 1 attack of acute arthritis
2. Maximal inflammation developed within 24 hours
3. Monoarthritis attack
4. Redness observed over joints
5. First metatarsophalangeal joint painful or swollen
6. Unilateral first metatarsophalangeal joint attack
7. Unilateral tarsal joint attack
8. Tophus (suspected)
9. Hyperuricemia
10. Asymmetric swelling within a joint on radiograph
11. Subcortical cysts without erosions on radiograph
12. Joint fluid culture negative for organisms during attacks

Rome Criteria[1]

Two of the following 4 criteria must be present to make a diagnosis of gout
1. Serum uric acid level ≥ 7.0 mg/dl in men, or ≥ 6.0 mg/dl in women
2. Tophi
3. Urate crystals in synovial fluid or tissues
4. History of attacks of painful joint swelling of abrupt onset with remission within 1–2 weeks

New York Criteria[1]

Urate crystals in synovial fluid or tissue
or presence of at least 2 of the following
1. History or observation of at least 2 attacks of painful limb swelling with remission within 1–2 weeks
2. History or observation of podagra
3. Presence of tophus
4. History or observation of a good response to colchicine (major reduction in objective signs of inflammation within 24 hours of onset of therapy)

RESULTS

Of 289 patients whose EMR were reviewed, 36% met the ACR preliminary criteria for the diagnosis of gout either by documentation of 6 of the clinical criteria or by demonstration of monosodium urate (MSU) in synovial fluid. The proportions of patients meeting the Rome or New York criteria for the diagnosis of gout were 30% and 33%, respectively (Table 2). Despite this low proportion, a surprisingly high proportion, 270 (93%), were documented to be using gout medications (allopurinol, colchicine, or probenecid). MSU crystals were found in 78 fluids and were negative in 6, and search for crystals was not recorded in 205. The mean number of months of followup for patients from their first recorded encounter in the electronic record was 93.5 months.

A subset analysis (Table 2) was performed on the 115 patients (40%) who had been seen by a rheumatologist. In this subset, 83 (73%) were documented to meet the ACR clinical criteria or had documented MSU in synovial fluid. Fifty-three (46%) of the patients in this subset met the ACR criteria based only on clinical features. Among the patients who had not seen a rheumatologist, only 11% met the ACR clinical criteria or had documented MSU.

The results from the 37 patients who were interviewed in clinic using the 3 sets of clinical criteria as the framework for the interview were then compared with the abstracted data from electronic chart review. A much higher proportion met the criteria (Table 2). Aspects of the clinical criteria such as "abrupt onset of an attack in < 24 hours" and "2 attacks of painful limb joint swelling and abrupt onset and remission in 1–2 weeks" were rarely documented in the EMR but were frequently reported as positive when the patient was asked directly about such symptoms.

DISCUSSION

We found that the majority of gout diagnoses recorded by ICD-9 code could not be validated in the EMR using any of the ACR, New York, or Rome criteria. These findings are similar to those of a study that examined administrative and billing data to identify patients with rheumatoid arthritis (RA)[9]. Another study of Medicare Part B claims in rheumatology specialty practices[10] showed high positive predictive value for some diagnoses such as RA and systemic lupus, but not for fibromyalgia and osteoarthritis of the hip. A study on claims-based diagnosis of acute myocardial infarction, however, showed excellent positive predictive value[11]. Further study on the usefulness of diagnostic coding in various settings seems to be needed.

Our findings suggest that there was either inadequate

Table 2. Percentages of patients seen by all providers, primary care providers, or rheumatologists who met the various criteria after detailed chart review or direct interview.

Feature	All Providers (%)	Primary Care Provider (1) (%)	Rheumatologist (2) (%)	Direct Interview (%)	p, 1 vs 2
Meets ACR criteria either by 6/12 clinical features or By presence of MSU crystals in fluid/tissues	103/289 (36)	20/174 (12)	83/115 (72)		< 0.0001
Meets New York criteria either by 2/4 clinical features or By presence of MSU crystals in fluid/tissues	94/289 (33)	9/174 (5)	85/115 (74)		< 0.0001
Meets Rome criteria by 2/4 features noted in Table 1 (1 feature is presence of MSU in fluid/tissues)	87/289 (30)	10/174 (6)	77/115 (67)		< 0.0001
Meets ACR criteria by 6/12 clinical features alone	68/289 (24)	15/174 (9)	53/115 (46)	30/37 (81)	< 0.0001
Meets New York criteria 2/4 clinical features alone	50/289 (17)	3/174 (2)	47/115 (41)	24/37 (65)	< 0.0001
Meets Rome criteria by 2/3 clinical features alone	51/289 (18)	5/174 (3)	46/115 (40)	29/37 (78)	< 0.0001

documentation or inaccurate diagnosis in the records that were examined. The gold standard for diagnosis of gout is identification of MSU crystals in synovial fluid or tissues[12]. This patient population receives the majority of its healthcare from primary care providers who are not likely to perform synovial fluid aspiration and analysis. The primary care providers are often caring for multiple comorbid illnesses, and due to time and other constraints are probably not documenting the musculoskeletal symptoms and findings in detail, and are likely to treat signs and symptoms that are suggestive of gout empirically without confirmation of the diagnosis. A higher proportion of patients who were seen by a rheumatologist had documentation of the various clinical classification criteria. In addition, rheumatologists were more likely to attempt to make a crystal diagnosis. This is especially true at this academic medical center, where the physicians take a particular interest in synovial fluid analysis.

We noted that when a small subset of patients was personally interviewed in the rheumatology clinic using the clinical criteria, higher proportions of patients met the criteria. This suggests that poor documentation (even by rheumatologists), rather than inaccurate diagnosis, may be the more likely explanation for much of the low positive predictive value of the chart review data. Using the proposed clinical criteria may be most successful in identifying patients with gout when they are used prospectively to interview patients. Pakhomov, *et al* also recently reported discordance between symptoms obtained by direct report and those recorded in the medical record[13]. We did not search for alternative diagnoses in patients who had ICD-9 codes for gout who did not meet criteria in this study. In another recent study, 50% of people with false-positive diagnoses of gout based on various criteria were found to have calcium pyrophosphate dihydrate crystals[12].

One strength of this analysis is that the entire EMR of the patient was reviewed in detail, beginning as early as 1997 in some patients. This allowed for chart review over a sufficient time period to evaluate an episodic rheumatic disease like gout.

Some limitations of our study include that the majority of the patients were male veterans over age 50 years, so that the results may not be generalizable to a more diverse patient population. Another limitation was that the quantity of records reviewed varied among patients depending on how long the patient had been using the VA system and on the frequency of their visits. One hundred eighty-four patients had a recorded diagnosis of gout before their first visit in the electronic record, so providers may have not felt compelled to record diagnostic features.

We found that the ability to document the accuracy of gout diagnoses in administrative claims ICD-9 data was poor. However, the positive predictive value of the data was improved when the patient was followed by a rheumatologist and was improved by direct patient interview.

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