

Healthcare Utilization Associated With Dyspepsia in Patients With Arthritis

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Abstract

Objective: To compare gastrointestinal-related healthcare resource utilization in arthritis patients with and without dyspepsia.

Study Design: A historical cohort study based on a claims database.

Patients and Methods: Data were obtained from the MarketScan database. Adult patients with a diagnosis of arthritis (*International Classification of Diseases, 9th Revision* [ICD-9] codes 714.0-715.9) during 1992 and 1993 were included; individuals with a diagnosis of dyspepsia within the first 3 months of their arthritis diagnosis were considered study case patients. Each case patient was matched with 4 nondyspeptic arthritis patients based on age, gender, employment status, and type of insurance plan. Healthcare resource utilization in terms of outpatient services and inpatient admissions during the first year after the initial arthritis diagnosis was compared between the case and control groups.

Results: A total of 503 case and 2146 control patients were identified. There were no significant differences in demographic characteristics between

the 2 groups. Dyspeptic patients (cases) had a significantly higher rate of claims for endoscopic procedures (odds ratio [OR] = 10.0, $P < .01$) than nondyspeptic patients (controls). Patients with dyspepsia also had a significantly higher claim rate of gastrointestinal ulcer or bleeding (OR = 4.2, $P < .01$) and were more likely to be hospitalized at least once (OR = 1.4, $P < .01$). Dyspeptic patients had overall higher frequencies of use of outpatient services (53.9 vs 32.5 claims per patient, $P < .001$) and higher costs for both inpatient admission and outpatient services than nondyspeptic patients.

Conclusion: Dyspeptic arthritis patients have higher healthcare resource utilization and associated costs than nondyspeptic arthritis patients.

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Dyspepsia is a common complaint among otherwise healthy individuals, but the term “dyspepsia” is often poorly defined in the literature.¹ Studies conducted in different populations using different research methods and differing definitions of dyspepsia have resulted in a literature base reporting a wide range of prevalence rates for dyspepsia.²⁻¹⁷ The 6-month to 5-year prevalence rates reported in population-based epidemiologic studies ranged from 7% to 41%, with a mode around 30%.¹⁸⁻²⁶

Using the Rome criteria,²⁷ Talley and colleagues²⁸ reported an overall prevalence of dyspepsia of approximately 25% among 835 nonclinic residents of Olmsted County, Minnesota. The United States

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Householder Survey showed a similar prevalence of 26% for gastroduodenal symptoms.²⁹ Three percent of the US householders were deemed to have functional or nonulcer dyspepsia, whereas 23% were considered to manifest aerophagia based on the Rome criteria for subgroups of functional bowel disorders.³⁰ With 25% of Americans suffering from dyspepsia and approximately one fourth of these patients being treated by their physicians,²³ dyspepsia has a considerable economic impact on the health system. In 1985, expenditures for dyspepsia and related conditions, not including the cost of over-the-counter preparations and outpatient endoscopies, reached \$1.2 billion.³¹ NyrÅn et al¹⁷ also reported a high cost of dyspepsia in Sweden.

Reports on the association of dyspepsia with other gastrointestinal (GI) events vary considerably with respect to their results. Lindberg et al³² suggested that nearly 20% of dyspepsia patients have peptic ulcer disease. Gotthard et al³³ and Kagevi et al³⁴ reported peptic ulcer disease rates of 7.3% and 14%, respectively, among dyspepsia patients.

Nonsteroidal anti-inflammatory drugs (NSAIDs) are mainstay treatment for those with arthritis and musculoskeletal problems. Because NSAIDs may cause signs and symptoms of GI dysfunction, physicians generally believe the prevalence of dyspepsia is significantly higher among arthritis patients than in the general population. Although research on dyspepsia has been conducted in a variety of populations and clinical settings, few studies have been conducted in arthritis patients based on real-world, clinical practice data. In addition, the association of dyspepsia with healthcare resource use has not been studied in arthritis patients or chronic NSAID users based on clinical practice data.

The purpose of this study was to examine the healthcare resource utilization in osteoarthritis and rheumatoid arthritis patients reporting dyspepsia, using a large insurance claims database.

...MATERIALS AND METHODS...

Database

The MarketScan database (MEDSTAT Group, Ann Arbor, MI) was the data source for this study. MarketScan is an insurance claims database with information on healthcare resource utilization by employees of a number of large US corporations and the dependents of those employees. MarketScan contains insurance claims for about 6.7 million privately insured individuals (collectively) for the years

1987-1994 and represents annual health expenditures of \$1.1 billion. Healthcare resource use data include inpatient admissions, outpatient services, and some outpatient prescription drugs. Each inpatient admission claim includes information on diagnoses (based on *International Classification of Diseases, 9th Revision* [ICD-9] codes), procedures (based on Current Procedural Terminology [CPT-4] codes), length of stay, payments made to the hospital, and other variables. The outpatient service claim information includes diagnoses, procedures, payments made to physicians, and other variables. Because prescription drug information was available for only about 10% of the population in the database, this study made no comparisons based on the use or economic impact of prescription drugs. For the purposes of this study, data from 1992 to 1994 were used. A total of 2.8, 3.5, and 4.2 million privately insured lives were contained in the database for the years 1992, 1993, and 1994, respectively.

Patient Selection and Study Groups

The study population consisted of patients 18 years and over in age with a diagnosis of osteoarthritis or rheumatoid arthritis (ICD-9 codes 714.0-715.9) during calendar years 1992 or 1993. Any patient who had a dyspepsia claim (ICD-9 codes 787.1 [heartburn] and 536.8 [dyspepsia and other diagnoses of specific GI dysfunction]) within 3 months of the first arthritis diagnosis was considered a "dyspeptic arthritis" case. Each dyspeptic arthritis patient was matched with 4 "nondyspeptic arthritis" control patients according to age, gender, employment status (full-/part-time or seasonal, retired), and type of insurance plan. To reduce the possibility of a nondiagnosed dyspeptic condition in the control group, all the control patients were searched back for 3 months and monitored for 1 year from the first date of their arthritis diagnosis to see whether there was any diagnosis of dyspepsia. Only those who did not have such a diagnosis were eligible for the control group. Claims data were analyzed for 1 year from the first date of dyspepsia diagnosis for case patients and arthritis diagnosis for control patients.

Data Analyses and Statistics

Analyses were conducted by using the DataProbe system (MEDSTAT Group, Ann Arbor, MI) and SAS, version 6.0 (Statistical Analysis System, Cary, NC). For all statistical tests, comparisons were made between dyspeptic and nondyspeptic arthritis patients using the chi-square test

for categorical variables and Student *t* test for continuous variables.

Claims for total outpatient and inpatient services in major diagnostic categories (MDCs) were compared between the case and control groups. Total outpatient claims were analyzed using the Student *t* test on log-transformed data. For outpatient services and inpatient admissions among diseases and disorders (D&D) of the digestive system, GI ulcer and bleeding episodes were identified by ICD-9 code (531.0-534.9, 578.0, 578.1, and 578.9) and were compared between study groups. All costs were adjusted to 1994 dollars based upon the following formulae³⁵:

$$\text{Adjusted 1992 cost} = \text{cost of 1992} \times (1 + 5.9\%) \times (1 + 4.8\%)$$

$$\text{Adjusted 1993 cost} = \text{cost of 1993} \times (1 + 4.8\%)$$

Cost comparisons between the case and control groups were made on the basis of the average healthcare resource utilization cost per patient, which was calculated by the formula:

$$\text{Average healthcare utilization cost per patient} = [\text{Average healthcare utilization cost} \times (\text{number of patients with claims})] / \text{number of patients in study group}$$

...RESULTS...

A total of 503 dyspeptic arthritis patients (cases) were identified from the 1992 and 1993 databases, and 2146 nondyspeptic arthritis patients (controls) were matched to the cases. There were no significant differences in employment status or type of insurance plan between the 2 groups (Table 1). For both groups, approximately 52% were older than 55 years, a majority were females (71%), about 70% were employed full-time or part-time, and approximately 25% were retirees. About 45% were insured by an exclusive provider organization, 36% by a health maintenance

organization, and 16% had comprehensive or basic/major medical coverage.

Table 2 compares claims for outpatient services in MDCs (based on ICD-9 codes), with the categories listed in rank order of their occurrence in this study population. The average number of claims for any outpatient services for the dyspeptic group during 1 year was 53.9 per patient compared with only 32.5 per patient in the nondyspeptic group (*P* < .001). The difference between dyspeptic and nondyspeptic patients in outpatient visits was primarily due to D&D of the musculoskeletal system and connective tissue and D&D of the digestive system. Among the claims for D&D of the digestive system, 0.7% were for GI ulcers or bleeding in dyspeptic patients, whereas only 0.3% were for GI ulcers or bleeding in

Table 1. Characteristics of Study Population of Dyspeptic (Case) and Nondyspeptic (Control) Arthritis Patients*

Characteristic	Percentage	
	Cases (n = 503)	Controls (n = 2146)
Age		
≥55 y	54.9	51.3
<55 y	45.1	48.7
Gender		
Female	70.6	71.0
Male	29.4	29.0
Employment status		
Full-/part-time or seasonal	70.4	69.2
Retired	24.5	25.5
Unknown	5.2	5.4
Insurance plan		
Comprehensive or basic [†]	15.7	15.7
Exclusive provider organization	45.9	44.1
Health maintenance organization	35.8	37.1
Point-of-service plan	0.8	1.0
Unknown	1.8	2.1
Year of arthritis claim		
1992	56.1	55.4
1993	43.9	44.6

*Differences between case and control groups were not significant.

[†]Comprehensive or basic major medical coverage.

... RESOURCE UTILIZATION ...

nondyspeptic patients. Table 2 also shows the average number of claims per patient for GI ulcers and bleeding among dyspeptic patients was 4 times that among nondyspeptic patients (0.4 vs 0.1, $P < .001$). The number of claims for other common MDCs was slightly higher for dyspeptic patients than for nondyspeptic patients.

The distribution of claims among the MDCs for inpatient admissions differed considerably between the 2 groups (Table 3). The number of inpatient admissions per 100 patients was significantly higher for the dyspeptic group compared with the nondyspeptic group (32.6 vs 21.9, $P < .001$). The highest admission rate among the MDCs in the dyspeptic

Table 2. Comparison of Outpatient Service Claims in 1 Year in Each Major Diagnostic Category Between Dyspeptic (Case) and Nondyspeptic (Control) Arthritis Patients

Major Diagnostic Category	Cases (n = 503)			Controls (n = 2146)		
	No.	Percentage	Claims per Patient	No.	Percentage	Claims pe
D&D of musculoskeletal system and connective tissue*	8577	31.6	17.3*	30,536	43.8	14.2*
D&D of digestive system†	4248	15.7	8.4†	2951	4.2	1.4†
GI ulcers or bleeding among D&D of digestive system‡	189	0.7	0.4‡	204	0.3	0.1‡
D&D of circulatory system	2168	8.0	4.3	5406	7.8	2.5
D&D of ear, nose, mouth, and throat	1411	5.2	2.8	3270	4.7	1.5
D&D of skin, subcutaneous tissue, and breast	1300	4.8	2.6	4116	5.9	1.9
Mental D&D	1274	4.7	2.5	1995	2.9	0.9
Endocrine, nutritional, and metabolic D&D	1251	4.6	2.5	3755	5.4	1.7
Factors in health status and other contacts with health services	1113	4.1	2.2	3161	4.5	1.5
D&D of the respiratory system	1096	4.0	2.2	2339	3.4	1.1
Other MDCs§	4236	15.6	8.4	10,179	14.6	4.7
Missing	469	1.7	0.9	1954	2.8	0.9

CI = confidence interval; D&D = diseases and disorders; GI = gastrointestinal; MDC = major diagnostic category.

*Anti-log mean (95% CI) was 9.32 (8.52, 10.22) for case patients and 8.01 (7.68, 8.35) for control patients; $P < .001$.

†Anti-log mean (95% CI) was 1.52 (1.45, 1.62) for case patients and 0.48 (0.45, 0.50) for control patients; $P < .01$.

‡Anti-log mean (95% CI) was 0.18 (0.175, 0.189) for case patients and .04 (.0396, .0404) for control patients; $P < .001$.

§Other MDCs include D&D of nervous system; D&D of the eye; D&D of the hepatobiliary system and pancreas; D&D of kidney and urinary tract; D&D of male reproductive system; D&D of female reproductive system; pregnancy, childbirth, and puerperium; newborns/neonates with conditions occurring in perinatal period; D&D of blood and blood-forming organs and immune disorders; myeloproliferative D&D and poorly differentiated neoplasm; infectious and parasitic diseases, systemic or unspecified sites; alcohol/drug use and alcohol/drug-induced mental disorders; injuries, poisoning, and toxic effects of drugs; burns; and human immunodeficiency virus infections.

||Anti-log mean (95% CI) was 39.2 (36.2, 41.8) for case patients and 20.43 (19.54, 21.33) for control patients; $P < .001$.

group was for D&D of the digestive system (8.2 per 100 patients), which was significantly different ($P < .001$) from that the nondyspeptic group (1.9 per 100 patients). The detailed analysis of inpatient claims for D&D of the digestive system showed the admission rates per 100 patients for GI ulcers or bleeding in the dyspeptic and nondyspeptic groups were 1.0 and 0.4, respectively. The GI ulcer or bleeding rates,

however, were not significantly different between the 2 groups ($P > .05$).

Table 3 also shows the proportion of admissions by MDC. The 3 most common MDCs for dyspeptic patients were D&D of the digestive system, D&D of the musculoskeletal system and connective tissue, and D&D of the circulatory system. However, in the nondyspeptic group the order was D&D of the mus-

Table 3. Comparison of Inpatient Admission Claims in 1 Year in Each Major Diagnostic Category Between Dyspeptic (Case) and Nondyspeptic (Control) Arthritis Patients

Major Diagnostic Category	Cases (n = 503)			Controls (n = 2146)		
	No.	Percentage	Admissions per 100 Patients	No.	Percentage	Admissions per 100 Patients
D&D of digestive system*	41	25	8.2	40	8.5	1.9
GI ulcers or bleeding among D&D of digestive system†	5	3.0	1.0	9	1.9	0.4
D&D of musculoskeletal system and connective tissue‡	32	19.5	6.4	182	38.8	8.5
D&D of circulatory system	31	18.9	6.2	81	17.3	3.8
D&D of the respiratory system	16	9.8	3.2	24	5.1	1.1
Mental D&D	10	6.1	2.0	18	3.8	0.8
D&D of hepatobiliary system and pancreas	6	3.7	1.2	12	2.6	0.6
Endocrine, nutritional, and metabolic D&D	5	3.0	1.0	6	1.3	0.3
Other MDCs§	23	14.0	4.6	105	22.4	4.9
Missing	0	0	0	1	0.2	0
Total admissions	164	100	32.6	469	100	21.9

D&D = diseases and disorders; GI = gastrointestinal; MDC = major diagnostic category.

*The proportion of admissions for D&D of digestive system was significantly different between case and control patients; $P < .001$.

†The proportion of admissions for GI ulcer or bleeding among D&D of digestive system was not significantly different between case and control patients; $P > .05$.

‡The proportion of admissions for D&D of musculoskeletal system and connective tissue was significantly different between case and control patients; $P < .001$.

§Other MDCs included D&D of nervous system; D&D of the ear, nose, mouth, and throat; D&D of the skin, subcutaneous tissue, and breast; D&D of kidney and urinary tract; D&D of male reproductive system; D&D of female reproductive system; pregnancy, childbirth, and puerperium; D&D of blood and blood-forming organs and immune disorders; myeloproliferative D&D and poorly differentiated neoplasm; infectious and parasitic diseases, systemic or unspecified sites; alcohol/drug use and alcohol/drug-induced mental disorders; and injuries, poisoning, and toxic effects of drugs.

||The number of inpatient admissions per 100 patients was significantly higher in the case group than in the control group; $P < .001$.

culoskeletal system and connective tissue, other MDCs, and D&D of the circulatory system.

In Table 4, claims for endoscopy, diagnosis of GI ulcers or bleeding, and hospitalizations are com-

pared between dyspeptic and nondyspeptic arthritis patients. In total, 25.2% (127/503) dyspeptic arthritis patients had at least one endoscopy in the 1-year period, whereas only 3.3% (70/2146) of

nondyspeptic arthritis patients had an endoscopy (odds ratio [OR] = 10.0, $P < .0001$). More than 15% (78/503) of dyspeptic arthritis patients had GI ulcer or bleeding claims or hospital admissions with a primary or secondary diagnosis of GI ulcers or bleeding, compared with only 4.1% (89/2146) of the nondyspeptic arthritis patients (odds ratio [OR] = 4.2, $P < .0001$). Although the study showed a numerically higher admission rate for GI ulcers or bleeding among dyspeptic arthritis patients compared with nondyspeptic arthritis patients, the difference was not statistically significant. However, outpatient GI ulcer or bleeding rates among dyspeptic arthritis patients and nondyspeptic arthritis patients were significantly different (14.5% vs 3.7%, OR = 4.4, $P < .0001$). Dyspeptic arthritis patients were more likely to be hospitalized than nondyspeptic arthritis patients (OR = 1.4, $P < .01$). GI-related hospitalization in the dyspeptic group was significantly higher than that in the nondyspeptic group (OR = 3.6, $P < .001$). No significant difference in musculoskeletal disorder-related hospitalization, however, was found between the dyspeptic and nondyspeptic patients.

Comparisons between dyspeptic and nondyspeptic arthritis patients also were made on the basis of the average cost per event and the average cost per patient for inpatient admissions and outpatient services during 1 year (Table 5). Case patients had 5 inpatient admissions for GI ulcers or bleeding in 1 year.

Table 4. Comparison of Dyspeptic (Case) and Nondyspeptic (Control) Arthritis Patients With Respect to Claims for Endoscopy, Diagnosis of GI Ulcer or Bleeding, and Hospitalizations

Variable	Cases (n = 503)	Controls (n = 2146)	Odds Ratio	P
Patients who had endoscopy*				
Inpatient or outpatient				
Yes	127	70	10.0	<.0001
No	376	2076		
Inpatient				
Yes	8	11	3.1	<.01
No	495	2135		
Outpatient				
Yes	122	61	11.0	<.001
No	381	2085		
Patients who had GI ulcers or bleeding*†				
Inpatient or outpatient				
Yes	78	89	4.2	<.0001
No	425	2057		
Inpatient				
Yes	5	9	2.4	NS
No	498	2137		
Outpatient				
Yes	73	80	4.4	<.0001
No	430	2066		
Patients hospitalized at least once in 12-month period				
Yes	109	347	1.4	<.01
No	394	1799		
GI-related hospitalizations‡				
Yes	29	36	3.6	<.001
No	474	2110		
Musculoskeletal disorder-related hospitalizations§				
Yes	29	160	0.76	NS
No	474	1986		

GI = gastrointestinal; ICD-9 = *International Classification of Diseases, 9th Revision*; MDC = major diagnostic category; NS = not significant.

*All inpatient events were primary or secondary diagnoses.

†ICD-9 codes: 531.00-534.91, 578.0, 578.1, 578.9.

‡MDC code 6: diseases and disorders of the digestive system.

§MDC code 8: diseases and disorders of the musculoskeletal system and connective tissue.

The average cost per event of these 5 admissions was \$17,879, and the average cost of GI ulcer or bleeding admissions per dyspeptic arthritis patient was \$178. There were 9 GI ulcer or bleeding admissions among nondyspeptic patients; the average cost per admission was only about half that of the dyspeptic group (\$8635), and the average cost per nondyspeptic patient was only \$36. The average cost per hospitalization for other (non-GI ulcer or bleeding) diagnoses in dyspeptic patients was higher than that in nondyspeptic patients (\$4320 vs \$2944). The average outpatient cost per event for

GI ulcer or bleeding also was higher in the dyspeptic patients than in the nondyspeptic patients (\$407 vs \$261). Since dyspeptic patients had higher GI ulcer/bleed outpatient claim rates and higher average outpatient service costs for these claims than nondyspeptic patients, the average outpatient GI ulcer or bleeding per patient also was higher in dyspeptic patients than nondyspeptic patients. In addition, the average cost per patient for outpatient services for other diagnoses was significantly higher for the dyspeptic patients than for the nondyspeptic patients ($P < .001$).

Table 5. Cost Comparisons of Dyspeptic (Case) and Nondyspeptic (Control) Arthritis Patients

Variable	Cost					
	Cases (n = 503)			Controls (n = 2146)		
	No. of Actual Events	\$ Per Actual Event	\$ Per Patient	No. of Actual Events	\$ Per Actual Event	\$ Per Patient
Inpatient Admission						
GI ulcers or bleeding	5			9		
Mean		17,879	178		8635	36
SD		16,606	—		6255	—
Anti-log mean		10,779	107		7217	30
95% CI of anti-log mean		3211, 36,183	32, 360		4595, 11,333	19, 48
Other	108			342		
Mean		20,121.90	4320		18,471	2944
SD		55,483.80	—		30,651	—
Anti-log mean		10,572.90	2270		11,310	1802
95% CI of anti-log mean		8887, 12,579	1908, 2701		10,258, 12,470	1635, 1987
Outpatient Claim						
GI ulcers or bleeding*	73			80		
Mean		407	59		261	36
SD		544	—		411	—
Anti-log mean		145	21		68	3
95% CI of anti-log mean		100, 209	15, 30		43,107	2, 4
Other*	503			2146		
Mean		4968	4968		3075	3075
SD		5997	5997		4415	4415
Anti-log mean		2983	2983		1909	1909
95% CI of anti-log mean		2697, 3299	2697, 3299		1800, 2024	1800, 2024

CI = confidence interval; GI = gastrointestinal.

* Significantly different; $P < .001$. Statistics were derived from $\log(x)$.

...DISCUSSION ...

This study compared healthcare resource utilization between dyspeptic arthritis patients and nondyspeptic arthritis patients using data from a large, nationwide claims database. It was observed that arthritis patients with dyspepsia had a significantly higher chance of having an outpatient service claim for GI ulcers or bleeding and were more likely to have an inpatient admission for GI ulcers or bleeding than those without dyspepsia. The results of this study also showed that healthcare resource utilization in dyspeptic patients in terms of frequency of outpatient service claims and inpatient admissions and costs per individual claim and admission was higher than that for the nondyspeptic group.

Several studies have suggested a weak association between dyspepsia and GI bleeding in arthritis patients.^{36,37} Armstrong and Blower³⁶ reported that 58% of NSAID users with GI bleeding sufficiently severe to require hospitalization had no previous dyspepsia. Skander et al³⁸ reported that 83% of patients over 75 years of age had no previous dyspepsia. Two possible explanations can be postulated for this weak association: (1) the mechanisms involved in producing dyspepsia and bleeding are not related; or (2) more probably, NSAIDs have an analgesic effect on the stomach. If the latter is true, NSAID-induced bleeding should be unrelated to or weakly associated with dyspepsia during periods of NSAID use. However, NSAID-induced GI damage exists whether or not a patient shows signs or symptoms of dyspepsia. We found an association between dyspepsia and outpatient claims and inpatient admission for GI ulcers or bleeding. Nearly 16% of arthritis patients with dyspepsia had a claim or at least one inpatient admission for GI ulcers or bleeding during the first year after the initial diagnosis of dyspepsia. In contrast, only 4% of nondyspeptic patients had a claim or inpatient admission for GI ulcers or bleeding within the first year after diagnosis of arthritis. This result is similar to the findings of studies by Lindberg et al,³² Gotthard et al,³³ and Kagevi et al,³⁴ in which the rate of peptic ulcer disease among dyspeptic patients ranged from 7.4% to 20%.

The observed association, however, may not reflect a causal relationship between dyspepsia and GI ulcers or bleeding. The excess rate of claims and admissions for GI ulcers or bleeding in the dyspeptic group may be because dyspeptic patients are more likely to be diagnosed than nondyspeptic

patients. For example, a patient diagnosed with dyspepsia is more likely to be diagnosed for an upper GI condition. The difference in outpatient claims rates for GI ulcers or bleeding between dyspeptic patients and nondyspeptic patients was significantly higher than that for inpatient diagnosis of GI ulcers or bleeding (OR 4.4 vs 2.4), suggesting that part of the excess rate is due to higher probability of being diagnosed with a GI condition.

Dyspepsia affects 25% to 41% of the worldwide population,^{28,39} and about 25% of people with dyspepsia seek medical attention. Ulcer rates in the general population are, however, quite low.³⁹ Given these factors, the rate of 16% for GI ulcers or bleeding among dyspeptic arthritis patients in this study represents a considerable amount of healthcare resource utilization.

The cost of hospitalization for GI complications related to peptic ulcers with bleeding or perforation has been reported in several studies. Kong and colleagues⁴⁰ found that the US national average total charge for hospitalization for GI ulcers or bleeding as a primary diagnosis was \$14,294 in 1992, based on the Healthcare Utilization Project (HCUP-3) database. A similar analysis using the MarketScan database showed the average total hospitalization payment for GI ulcers or bleeding during 1994 was \$13,150. Similar findings were reported by Maetzel et al⁴¹ and Elixhauser et al.⁴² This study corroborates these findings and also found that the average cost per GI hospitalization for dyspeptic patients was significantly higher than that for nondyspeptic patients, while average hospital costs were not different between the 2 groups for admissions for other diagnoses. These results suggest the difference in hospitalization costs for GI ulcers or bleeding between the 2 groups could be attributed to the more expensive procedures used for dyspeptic patients.

Increased rates of both hospitalizations and outpatient services for GI events and the higher cost per hospitalization and outpatient service among dyspeptic arthritis patients contribute to a total healthcare resource utilization significantly higher than that for nondyspeptic arthritis patients. This study also found that at least 25% of patients with a dyspepsia claim had an endoscopy, compared with 3% in the nondyspeptic group. The cost of an endoscopy procedure is a major component of the total cost of healthcare among dyspeptic arthritis patients.

Because dyspepsia is not clearly defined, many studies have failed to make a clear distinction between dyspepsia and other GI-related signs and

symptoms. For instance, Kurata et al^{15,16} identified dyspeptic patients as those with GI-related conditions who also reported proximal alimentary tract symptoms (eg, pain, discomfort, heartburn, vomiting, nausea) or other signs or symptoms resulting in an antiulcer medication prescription. NyrÅn et al¹⁷ also indicated that many studies have failed to make a clear distinction between dyspepsia and bowel-related symptoms and indicated that in a nationwide survey of all outpatient care in Sweden, the clinical diagnosis of gastritis was roughly equivalent to functional dyspepsia. To reduce selection bias caused by a vague definition of dyspepsia, our study constructed a dyspeptic cohort using only 2 clearly defined ICD-9 codes identifying dyspepsia patients: 787.1 (heartburn) and 536.8 (dyspepsia and other diagnoses of specific GI dysfunction). We believe that use of these 2 diagnoses allowed us to identify a clear dyspeptic cohort, which consequently gives our estimates of healthcare resources utilization greater reliability. However, such a narrow definition of dyspepsia may affect the results of the study. First of all, the ICD-9 codes used to define dyspepsia in the study may not cover all the dyspeptic symptoms that some physicians may use for the diagnosis. If this is true, dyspepsia patients defined in this study may not include all dyspeptic patients. Therefore, caution should be taken if one wants to generalize the results to all dyspeptic conditions (or symptoms). Second, patients who have a medical claim for dyspepsia might have symptoms that differ in severity from the symptoms of those who experience dyspepsia but do not receive medical care, which might result in an overestimation of healthcare resource utilization per dyspepsia case. To further reduce selection bias, only newly diagnosed dyspeptic arthritis patients were selected. Thus, the influence of patients with long-term arthritis and dyspeptic conditions was eliminated. Further, matching 4 nondyspeptic arthritis patients to each dyspeptic arthritis patient reduced the confounding effects of age, gender, employment status, and type of insurance plan.

The rationale for conducting such a dyspepsia study in arthritis patients was to reduce any confounding factors resulting from patients with other disease conditions, different medications, or different demographic profiles. Also, healthcare resource utilization in an arthritis population may not be the same as that in a population with other conditions. Practice patterns and physicians' perceptions regarding the severity of dyspeptic conditions among arthritis patients (eg, fear of GI ulcers or bleeding)

may differ from those for other disease conditions. The higher rate of dyspepsia among arthritis patients also provides greater statistical power to make comparisons. Last, the healthcare resource use of patients experiencing dyspepsia has not been recognized as a contributor to the overall healthcare costs of arthritis patients, even though dyspepsia is a common condition among arthritis patients.

One limitation of this study is the lack of prescription drug data. Because the MarketScan database captured prescription drug information on only 10% of the patients from 1992 to 1994, this study was not able to estimate the use or cost of prescription drugs. However, hospitalization and outpatient service costs represent a considerable portion of healthcare costs for dyspeptic arthritis patients. If the cost of medication for treating dyspeptic conditions was taken into account, the total cost of treating dyspeptic conditions would be higher than the cost shown in the study.

Also, insurance claims databases do not provide information on the severity of the disease condition, which is a limitation that is applicable to this study. Proxies for the severity of the condition could be made by using the strength and type of medications. However, this method is limited to a few select conditions that have a clear association between the severity of condition and medication use. It also could further confound interpretation of the results. This study does not explore such surrogates for severity of either arthritis or dyspepsia, which is a limitation.

...CONCLUSION...

This study has shown that dyspeptic arthritis patients have higher healthcare resource utilization rates and associated costs than nondyspeptic arthritis patients. These results suggest that the cause of dyspepsia among arthritis patients needs to be further studied and evaluated for its impact on healthcare resource utilization.

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