Concise Report

Health care utilization in patients with spondyloarthropathies

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Objective. To study health care utilization in veterans with SpAs.

Methods. In a postal survey of 70 508 veterans in Veterans Integrated Service Network (VISN)-13 from 1 October 1996 to 31 March 1998, demographics, smoking status and performance of activities of daily living (ADLs) were queried. Databases provided ICD-9 codes for AS, PsA and ReA; comorbidities; demographics; and health care utilization post-survey in respondents. Multivariable linear/logistic regression compared out- and inpatient health care utilization in SpA vs non-SpA, and its predictors in SpA.

Results. A total of 1001 veteran respondents had diagnoses of SpA: AS, $n = 154$; PsA, $n = 814$; ReA, $n = 33$. Veterans with AS, PsA and ReA, respectively, had significantly higher adjusted annual medical specialty (2.8, 3.6 and 3 vs 1.5; $P < 0.0001$), surgical care (3.3, 2.7 and 3.2 vs 1.9; $P < 0.0001$) and primary care visits (3.4, 3.0 and 2.3 vs 2.7, $P = 0.024$). Multivariable-adjusted analyses showed that more ADL limitations and higher comorbidity were associated with higher in- and outpatient health care utilization in PsA and none of the predictors were significantly associated with utilization in AS.

Conclusions. After adjustment for differences in demographics and comorbidities, more outpatient health resource utilization was observed in SpA patients. Further studies should focus on what leads to this increase in utilization, and whether any modifiable factors can be introduced to reduce health care utilization in PsA patients.

KEY WORDS: Psoriatic arthritis, Ankylosing spondylitis, Reactive arthritis, Health care utilization, Resource utilization, Health care use, Predictors.

Introduction

Treatment of SpAs including AS, PsA and ReA has been revolutionized in the last decade due to availability of new, effective biologics and brought into focus health resource utilization and cost-effectiveness. Since health resources are limited and SpAs are common [1], better understanding of health care utilization in these conditions is needed.

Most previous studies of health care utilization in SpA patients were conducted in European countries [2–7] according to patient-reported utilization [2–4, 6]. In one US study, AS patients reported two visits/yr to generalists and 2.1 visits/yr to rheumatologists, similar to mean of 1.4–4 visits/yr to generalists and 1.7–3.3 visits to specialists/rheumatologists reported in previous European Union studies [2–4, 6]. This is in sharp contrast with utilization assessed in administrative databases [5, 7]: 15.9–18.2 visits/yr to generalists in AS [5, 7], 20.3 in PsA [7] and 3.7–4.2 visits/yr to specialists/rheumatologists for AS patients [5, 7] and 3.9 for PsA [7]. This striking difference according to method of measurement (patient-reported vs administrative databases) confirms similar observations of the inaccuracy of patient-reports, with under-reporting at higher numbers of visits, compared with medical record ascertainment [8]. Differences in health care systems and country setting can also underlie some of these differences; age–gender distribution was similar.

All previous studies have used non-population-based SpA cohorts drawn from randomized trials [2], hospital-based [3, 4, 6, 9], hospital and community rheumatology practices [5] or rheumatology databases [7]. Non-population-based cohorts from tertiary rheumatology practices would be expected to have more severe disease and/or different socio-demographic/insurance characteristics than community-based cohorts; those in randomized controlled trials (RCTs) healthier than the general population—neither representative of all SpA patients. Population-based studies are expensive and difficult to conduct, for example, based on a prevalence of 1–3%, it is necessary to survey 100 000 patients to study outcomes in 1000–3000 patients with SpA. However, a population-based study is the only way to truly understand the real impact of disease, since it can capture the entire spectrum of disease severity, duration and socio-demographics.

The objective of this study was to determine health care utilization patterns in a population-based cohort of SpA patients. The Veterans Affairs (VA) is the largest integrated health care system in the United States that provided health care to more than 4.9 million subjects with a budget of $25 billion in 2003 [10]. As the veteran population is male predominant and arthritis is the fifth most common medical condition in veterans [11]; this population is well suited for studies of SpA. In this population-based cohort, study was designed to: (i) compare health care utilization in veterans with AS, PsA and ReA, to those without SpA; and (ii) study if utilization in SpA patients is attributable to socio-demographics, functional limitations and/or comorbidities.

Methods

Patient population

Details of the original survey are published [12]. VISN-13 is a health care network of in- and outpatient medical facilities that provides medical care to veterans in the geographical area consisting of North Dakota, South Dakota, Minnesota and selected counties of Iowa, Nebraska, Wisconsin and Kansas. A survey was mailed to all veterans with out- or inpatient encounters at a VA facility in this network during an 18-month period (31 October 1996 to 31 March 1998) and a valid mailing address. A reminder survey was sent to non-responders 4 weeks later. The survey response rate was 58% (40 508 of 70 334). The study was approved by the Institutional Review Board.

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Data sources

Survey data. The survey provided data regarding marital status, education level and functional status. Physical function was assessed querying limitations (no, some, unable) in six activities of daily living (ADLs: bathing, dressing, eating, transferring to and from chair, walking and using the toilet)—a validated measure [13], used very commonly in cohort studies [14, 15].

Administrative data. Survey data were supplemented by data from administrative and clinical databases. These included the following:

(i) International Classification of Diseases (ICD)-9 diagnoses codes for AS (720.0), PsA (696.0) and ReA (099.3, 711.11–711.19) for the year prior to the survey;
(ii) ICD-9 codes for most prevalent conditions in veterans [11]: chronic obstructive pulmonary disease (COPD), diabetes, depression, hypertension and heart disease for the year prior to the survey;
(iii) Demographics including race, employment status, age and gender;
(iv) Health care resource utilization data for 1 yr after the survey were obtained: number of inpatient visits and number and type of outpatient visits—primary, surgical, specialty medicine or mental health care.

Diagnoses of AS, PsA and ReA in the Minneapolis VA databases were found to have high specificity and predictive values of 89–100% and sensitivity of 71–100% [16].

Study outcomes

Health care utilization was assessed by annual in- and outpatient visits in respondents in the post-survey year. For the purposes of analyses, due to a highly right skewed distribution, inpatient utilization and outpatient mental health care visits were categorized as dichotomous, i.e. one or more admissions/yr *vs* none. Outpatient primary care, specialty medicine and surgical care visits were treated as continuous variables, combined into medical/surgical visits and divided into quartiles for regression analyses.

Analyses

Chi-square tests and independent-sample *t*-tests were used for categorical and continuous variables, respectively, comparing SpA with non-SpA patients. Unadjusted and multivariable-adjusted least means square scores were determined for continuous

(primary care, surgery or specialty care visits) outcomes using linear regression; and for categorical outcomes (any hospitalization, any mental health visit) using logistic regression analyses for patients with AS, PsA, ReA compared with those without SpA. Multivariable regression models adjusted for socio-demographic, comorbidity and smoking status (as listed in (i)–(iii) in the paragraph below).

Since conclusions based on adjusted estimates were not different from those based on unadjusted estimates, i.e. estimates were robust regardless of adjustments for socio-demographics, comorbidity and smoking status, both estimates are presented in Tables 2 and 3; only multivariable-adjusted estimates are discussed.

In patients with AS and PsA, logistic regression analyses assessed predictors for reporting the worst quartile of medical/surgical outpatient visits or having ≥ 1 inpatient hospitalizations. Regression analyses were not performed individually in patients with ReA due to small numbers. Potential confounders for multivariate analyses for predicting health care utilization were chosen based on reports in other medical conditions [17–19]: (i) demographics: age (in years), gender (male/female), race (white *vs* other), education level (<8 grade, 8–11 grade, high school graduate or college and beyond), employment status (employed, unemployed, retired, unknown), marital status (married, not married); (ii) comorbidity: sum of comorbidities including asthma/COPD, depression, diabetes, hypertension or heart disease (comorbidity scale ranging from 0 to 5); (iii) current smoking status (smoker *vs* non smoker; and (iv) ADL limitations, categorized as 'no': 0 ADLs, 'moderate': 1–2 ADLs; or 'severe limitations': ≥ 3 ADLs; similar to previous studies [14, 20]. All analyses were performed using SPSS version 11.0.1 (Chicago, IL, USA). A *P*-value <0.05 was considered significant.

Results

Demographic and clinical characteristics of patients with AS, PsA and ReA

A total of 1001 patients had diagnoses of SpA: AS ($n=154$), PsA ($n=814$) and ReA ($n=33$) (Table 1). AS, PsA and ReA patients were predominantly men with mean ages 58, 63 and 41 yrs, respectively. Patients with AS had a higher education level and PsA had more comorbidities than veterans without SpA. Patients with ReA were younger, current smokers, employed, also likely to be female and had fewer comorbidities compared with veterans without SpA. Survey non-responders were significantly less likely to be married (47 *vs* 64.9%) or retired (26.7 *vs* 43.9%) and were younger (56.3 *vs* 64.5 yrs), compared with responders.

TABLE 1. Demographic and clinical characteristics of patients with AS, PsA and ReA and subjects without SpA

	No SpA, mean ± s.d. or (%)	AS, mean ± s.d. or (%)	PsA, mean ± s.d. or (%)	ReA, mean ± s.d. or (%)	*P*-value*
Demographics					
Age, yrs	61 ± 15	58 ± 15	63 ± 13	41 ± 8	<0.001
Male	96	98	99	85	0.002
White	90	95	92	92	0.09
Married	53	60	56	46	<0.001
Education					<0.001
$\leq$8th grade	54	44	44	64	
Some high school	6	5	9	3	
High school graduate	20	21	25	15	
College and beyond	20	30	23	18	
Employment status					<0.001
Employed	34	33	28	58	
Unemployed	22	23	22	27	
Retired	36	38	45	9	
Unknown	7	7	5	6	
Clinical characteristics					
$\geq$1 comorbidity	52	57	66	33	<0.001
Current smokers	23	20	24	58	0.029

**P-value is for comparisons between subjects without SpA with those with AS, PsA or ReA, using χ^2- and Student's *t*-tests.

Higher outpatient health care utilization in SpA than non-SpA patients

Table 2 shows unadjusted and multivariable-adjusted in- and outpatient utilization patterns in SpA patients. Significantly more adjusted medical subspecialty (86–140% higher) and surgery clinic visits/yr (42–74% higher) were observed in patients with AS, PsA and ReA compared with the general veteran population (2.8, 3.6 and 3 *vs* 1.5; and 3.3, 2.7 and 3.2 *vs* 1.9; $P < 0.0001$ for both), respectively. Patients with AS and PsA had more and those with ReA fewer adjusted annual primary care visit rates than veterans without SpA (3.4, 3.0 and 2.3 *vs* 2.7; $P = 0.024$). No significant differences were noted in mental health visits, inpatient admissions or mortality between groups (Table 2).

Predictors of health care utilization in patients with PsA and AS

Table 3 shows predictors significantly associated with health care utilization in patients with PsA ($R^2 = 0.22–0.24$). None of the variables were significantly associated with higher outpatient health care utilization in patients with AS ($R^2 = 0.30–0.37$). More limitations in ADLs and comorbidities were associated with higher inpatient and medical/surgical outpatient clinic utilization in PsA, and male gender with more outpatient health care

utilization. Specifically, limitation in 1–2 ADLs was associated with greater outpatient utilization, but not hospitalizations; limitation of 3 or more ADLs was associated with increased use of both in- and outpatient services.

Discussion

Further studies are needed to examine whether the factors described in these hypotheses do in fact lead to increased utilization in patients with SpAs. Multivariable-adjusted outpatient primary, specialty and surgical care utilization was significantly higher compared with non-SpA patients: 16–25%, 86–140% and 42–74%, respectively. Adjusted rates of outpatient mental health and inpatient visits were similar. Increased use of medical/surgical outpatient visits may be due to many possible reasons: (i) primary care utilization related to symptoms of SpA (back pain, joint pain, enthesitis); presence or severity of other comorbid conditions; and/or treatment-related complications (more infections and medication-related adverse effects); (ii) surgical clinic utilization related to SpA (e.g. hip or knee arthroplasty) or surgeries related to associated comorbidities; (iii) specialty medicine visits likely reflecting regular follow-up visits to the rheumatology clinic for treatment of SpA and monitoring toxicities of DMARDs; and other specialty clinics (gastroenterology, nephrology and cardiology) for NSAID-induced

TABLE 2. Unadjusted and multivariable-adjusted[a] least mean squared estimates (95% CIs) for health care utilization by subjects with and without SpA

	Unadjusted rate of utilization					Adjusted rate of utilization				
	No SpA	AS	PsA	ReA	*P*-value	No SpA	AS	PsA	ReA	*P*-value
Number of outpatient clinic visits										
Primary care	**2.7**	**3.4**	**3.2**	**1.4**	**0.0005**	**2.7**	**3.4**	**3.0**	**2.3**	**0.024**
	(2.7, 2.7)	(2.8, 4.1)	(2.9, 3.4)	(0, 3.2)		(2.7, 2.7)	(2.8, 4.0)	(2.7, 3.2)	(0.6, 4)	
Medical subspecialty	**1.5**	**2.8**	**3.8**	**2.4**	**<0.0001**	**1.5**	**2.8**	**3.6**	**3.0**	**<0.0001**
	(1.4, 1.5)	(1.9, 3.8)	(3.4, 4.2)	(0, 5.1)		(1.4, 1.5)	(1.9, 3.8)	(3.2, 4.1)	(0.3, 5.8)	
Surgery	**1.9**	**3.2**	**2.8**	**2.3**	**<0.0001**	**1.9**	**3.3**	**2.7**	**3.2**	**<0.0001**
	(1.8, 1.9)	(2.6, 3.9)	(2.5, 3.1)	(0.4, 4.2)		(1.8, 1.9)	(2.7, 3.9)	(2.3, 2.9)	(1.3, 5.0)	
≥1 mental health clinic visits, %	13.4	15.3	13.4	18.1	0.92	12	13.1	10.9	12	0.867
	(13.1, 13.8)	(9.3, 24.3)	(10.7, 16.8)	(4.6, 50.7)		(11, 13.1)	(7.5, 21.8)	(8.4, 14.1)	(2.7, 40.3)	
≥1 inpatient hospitalizations, %	13.7	17.6	15.9	9.1	0.37	12.5	17.7	13.1	14.7	0.566
	(13.3, 14.1)	(11.1, 26.8)	(12.9, 19.3)	(1.3, 43.9)		(11.4, 13.8)	(10.8, 27.5)	(10.3, 16.6)	(21.4, 57.7)	
1-yr mortality, %	3.9	3.3	3.3	0	0.649	2.3	2.4	1.8	0	0.767
	(3.7, 4.1)	(1.1, 9.7)	(2, 5.2)	(NA)		(1.8, 3)	(0.7, 7.6)	(1, 3.1)	(NA)	

[a]Multivariable regression models adjusted for the following variables: age, gender, race, education level, marital status, employment status, comorbidity and current smoking status. Bold values represent statistically significant results. NA: not applicable.

TABLE 3. Significant predictors of utilization in patients with PsA in multivariable-adjusted analyses[a]

	Medical-surgical outpatient visits, highest quartile ($n = 486$)		Hospitalization (yes/no) ($n = 486$)	
Model characteristics				
Hosmer–Lemeshow test	4.21 ($P = 0.838$)		9.71 ($P = 0.286$)	
Negelkerke R^2	0.215		0.237	
−2 log likelihood	586.916		346.639	
Significant predictors ↓	OR (95% CI)	*P*-value*	OR (95% CI)	*P*-value*
ADL limitation		**<0.001**		**0.036**
1–2 ADLs	**2.6 (1.6, 4.2)**		1.1 (0.6, 2.3)	
≥3 ADLs	**2.5 (1.5, 4.1)**		**2.3 (1.1, 4.5)**	
Number of comorbidities		**<0.001**		**<0.001**
One	**2.2 (1.3, 3.6)**		**3.8 (1.6, 9.3)**	
Two	**2.8 (1.6, 5)**		**4.6 (1.8, 12)**	
Three	**3.1 (1.5, 6.5)**		**7.7 (2.8, 21.5)**	
Four	**14.9 (1.7, 127)**		**40.8 (7, 237)**	
Five	∞ (0, ∞)[b]		18.5 (0.9, 367)	
Male gender[c]	**9.8 (1.1, 89)**	**0.044**	∞ (0, ∞)	**NS**

[a]Multivariable regression models adjusted for the following variables: age, gender, race, education level, marital status, employment status, comorbidity, ADL limitation and current smoking status. [b]Could not be estimated due to a very small number of patients in this category. [c]Estimates have very wide CI or could not be estimated due to a very small number of women (referral category). *P-values indicate the statistical significance of each variable (e.g. ADL limitation, comorbidity) with the outcome; Bold values represent statistically significant results. NS: not significant (i.e. *P*-value ≥ 0.05).

complications and SpA-associated cardiac disease. Further studies are needed to examine whether these hypotheses do in fact lead to increased utilization in patients with SpAs. Regardless, these are remarkable differences in health care utilization rates, considering that multivariable analyses were adjusted for differences in socio-demographics, smoking status and comorbidities.

This study has several limitations. Results may not be generalizable to community-dwelling non-veterans with SpA, or to other VA networks, due to geographical differences, non-response bias and the unique age–gender distribution of the population. The survey response rate of 58% in our study is similar to the mean response rate of 54% reported for surveys of this size [21]. The non-response rate would have only affected the adjusted estimates of health care utilization, which were almost identical to the non-adjusted utilization estimates, and were available for all patients regardless of survey response status. However, generalizability issues are less compared with previous studies of referred patient populations, prone to selection/referral bias and inclusion of patients with more severe disease [7, 22–26] or from randomized controlled trials (RCTs), well known to be healthier than the general population. Since the eligibility criteria included an in-/outpatient visit to the VA in the 18 months preceding the survey, utilization could have been over-estimated since patients with less symptomatic disease are less likely to visit. Estimates for some predictors of utilization, especially higher comorbidity, had wide CIs indicating lack of precision due to small number of patients in these categories. A much larger number of patients had PsA than AS in our study. This differs from previous reports and may be due to referral bias, increased disease recognition with recent treatment advances or a higher prevalence in the US veteran population.

Cohorts were identified using ICD-9 codes, already demonstrated to be valid in these databases [16], but there were no data on non-VA diagnoses of SpA or non-VA utilization. The first would lead to misclassification and non-VA utilization would be more likely in SpA than non-SpA, lowering estimates in SpA, each potentially biasing study findings towards null. Therefore, estimates between SpA and non-SpA in this study are conservative. No information on the severity of SpA was available, which limits comparison with studies providing this information and limited us in assessing this as a predictor of resource utilization. Future studies should address outcomes in patients with juvenile AS, uSpAs and IBD-related arthritis.

Strengths of this study included: the large population-based sample that allowed robust estimates (with small adjustment changes); use of socio-demographic and comorbidity characteristics as predictors of utilization in patients with AS and PsA; and reporting of detailed utilization characteristics.

A higher number of associated comorbidities in PsA patients was strongly associated with more in- and outpatient health care utilization: odds for higher utilization were increased 2-fold in patients with two comorbidities to 40-fold in those with four. More limitations in performance of ADLs also increased the odds of utilization 2- to 2.5-fold. Recent RCTs have shown improvement in physical function and skin disease (comorbidity) in patients with PsA, following treatment with biologic agents [27–29]—and use of etanercept by patients with PsA reduced health care utilization [30]. It is likely that the reduction in utilization with etanercept can be attributed to improvements in physical function and skin lesions, as comorbidity and physical function appear to be strong predictors of increased utilization (as demonstrated in this study), To date there are no published studies of predictors of utilization in PsA for comparison.

In comparison with PsA, the lack of association between limitations in ADLs and health care utilization in AS may be due to the smaller sample size available for AS ($n = 83$–93) vs PsA ($n = 424$–486) or to different patterns of utilization—which merits further study with larger cohorts of AS patients. A previous study of AS patients found that more limitations in ADL were significantly associated with higher costs at 1 and 5 yrs (241 and 111 patients, respectively) [9]. Future studies should examine the association of comorbidities, both number and severity, with increased health care utilization, and to test whether better control of comorbidities reduces this in SpA patients.

The finding of 3.4 annual outpatient generalist and 2.8 specialist visits by AS patients is within the previously reported range of 1.4–4.0 generalist and 1.7–2.8 specialist visits in European studies [2–4, 6], but higher than 2.1 and 2.1 visits, respectively, from the US cohort [9]. Two previous studies that used administrative databases from Canada [5] and Germany [7] reported 16–18 generalist and 3.7–4.2 rheumatologist visits annually. Health care delivery systems; countries; studied cohorts (population-based study of US veterans vs hospital- and community-based rheumatology practices/RCT populations); patient characteristics (98–99% men with a mean age of 57–63 yrs in veterans vs 37–57% women with a mean age of 43–53 yrs); method for ascertaining health care utilization (administrative vs patient-reported databases); presence of medical comorbidities and disease severity may explain these differences in health care utilization.

This study adds to the current knowledge by providing detailed adjusted utilization estimates for PsA and ReA compared with the general population, an understudied area. The most relevant comparison to this study is the US study of AS patients by Ward [9]. Slightly higher utilization in this study may be attributed to use of administrative databases vs patient-reports—under-reporting of outpatient utilization has been documented when querying longer than a 2-week period, due to recall bias [8].

In summary, this population-based study of US veterans with AS, PsA and ReA demonstrated that outpatient health care utilization was higher compared with those without SpA, even after adjustment for age, socio-demographics and comorbidities. The association of more functional limitations and comorbidities with higher in- and outpatient health care utilization in patients with PsA indicates that it may be possible to decrease utilization by improving function and preventing, and effectively treating associated comorbidities. Similar studies are needed in larger cohorts of AS and ReA patients.

Rheumatology key messages

- SpA patients have higher adjusted out- and inpatient utilization rates than those without SpA.
- In patients with PsA, more activity limitation and comorbidity predict higher in- and outpatient utilization.

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