Demographic and Clinical Factors Associated with Physician Service Use in Systemic Sclerosis

SASHA BERNATSKY, PANTELIS PANOPOLIS, MARIE HUDSON, JANET POPE, SHARON LECLERCQ, DAVID ROBINSON, NIALL JONES, JANET MARKLAND, MAYSAN ABU-HAKIMA, JEAN-PIERRE MATHIEU, PETER DOCHERTY, NADER KHALIDI, EVELYN SUTTON, MURRAY BARON, and the Canadian Scleroderma Research Group

ABSTRACT. ***Objective.*** To assess physician service use in a large sample of patients with systemic sclerosis (SSc), and to determine factors associated with physician use.

Methods. Our sample was a national SSc registry maintaining data on demographics (age, sex, race/ethnicity, education, income) and clinical factors (disease onset, organ involvement, etc.). Registry cohort members completed detailed questionnaires, and rheumatologists provided clinical assessments. We examined cross-sectional data from 397 patients who provided information on physician visits in the past 12 months. Patients were classified as high physician-users if they reported more than the median number (6) of physician visits in the past year. In multivariate logistic regressions, we assessed the independent effects of race/ethnicity, education, degree of skin involvement, comorbidity, and SF-36 scores on physician use.

Results. On average, subjects reported 3.8 visits per year to specialty physicians (SD 4.2) and 3.5 visits per year to family physicians (SD 4.3). Regression models suggested the following factors as independently associated with number of physician visits: high skin scores, greater comorbidity, and low physical component summary scores on the SF-36.

Conclusion. There is evidence of independent relationships between clinical characteristics and physician use by patients with SSc. (First Release Nov 15 2008; J Rheumatol 2009;36:96–98; doi:10.3899 /jrheum.080623)

Key Indexing Terms:
SYSTEMIC SCLEROSIS SCLERODERMA PHYSICIAN USE
COMORBIDITY HEALTH RESOURCES

From McGill University, Montreal, Quebec, Canada; University of California, San Francisco, California, USA; University of Western Ontario, London, Ontario; University of Calgary, Calgary, Alberta; University of Manitoba, Winnipeg, Manitoba; University of Alberta, Edmonton, Alberta; University of Saskatchewan, Regina, Saskatchewan; University of Montreal, Montreal, Quebec; Dalhousie University, Halifax, Nova Scotia; and McMaster University, Hamilton, Ontario, Canada.

Dr. Bernatsky is a Canadian Arthritis Network (CAN) scholar and is supported by the Canadian Institutes of Health Research (CIHR), Fonds de recherche en santé du Québec (FRSQ), and the McGill University Health Centre (MUHC) Department of Medicine and Research Institute. Dr. Hudson is a CAN scholar and is supported by the CIHR. Dr. Baron is the director of the Canadian Scleroderma Research Group, which is supported by research grants from the CIHR, the Cure Scleroderma Foundation, the Scleroderma Society of Canada, and the Ontario Arthritis Society, as well as educational grants from Actelion Pharmaceuticals, Pfizer Incorporated and Encysive Pharmaceuticals.

S. Bernatsky, MD; M. Hudson, MD; M. Baron, MD, McGill University; P. Panopolis, MD, University of California, San Francisco; J. Pope, MD, University of Western Ontario; S. LeClercq, MD, University of Calgary; D. Robinson, MD, University of Manitoba; N. Jones, MD, University of Alberta; J. Markland, MD, University of Saskatchewan; M. Abu-Hakima, MD, University of Calgary; J-P. Mathieu, MD, University of Montreal; P. Docherty, MD, Dalhousie University; N. Khalidi, MD, McMaster University; E. Sutton, MD, Dalhousie University.

Address reprint requests to Dr. S. Bernatsky, Division of Clinical Epidemiology, Research Institute of the McGill University Health Centre, 687 Pine Avenue West, V-Building, Montreal, Quebec H3A 1A1. E-mail: sasha.bernatsky@mail.mcgill.ca

Accepted for publication August 18, 2008.

Systemic sclerosis (SSc) is a multisystem disorder affecting close to 100,000 people in North America[1]. Although a relatively rare condition, the morbidity and mortality associated with this disorder[2] impose a burden on individuals and on society. There is a paucity of data related to the use of medical resources by patients with SSc. Our aim was to assess physician service use in a large sample of patients with SSc, and to establish factors associated with physician use.

MATERIALS AND METHODS

The Canadian Scleroderma Research Group currently comprises 15 centers in British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, Quebec, New Brunswick, and Nova Scotia. These contribute to a national registry of adult patients with SSc as confirmed by a rheumatologist. Study investigators undergo training sessions to ensure homogeneity of clinical measures including skin scores, and investigator meetings are held at least twice a year to review measurement issues, data quality, and related issues. In the registry, data are available regarding demographics (age, sex, race/ethnicity, education, income) as well as clinical factors, such as date of disease onset (defined by the onset of the first non-Raynaud's disease manifestation), comorbidity, and organ involvement.

All demographic factors are self-reported. For race/ethnicity, 14 different self-reported categories are offered, plus the option of "other" (with space for subjects to specify what "other" is). Highest education level attained is chosen from "less than 7 years of school" up to "postgraduate

education." Yearly family income (Canadian dollars, before taxes) is chosen from 8 categories ("less than $20,000 per year" to "greater than $80,000 per year").

Annually, the cohort registry members complete detailed clinical questionnaires, and the treating rheumatologist completes standardized clinical assessments. Measures include the Self-administered Co-morbidity Questionnaire (SCQ)[3] and assessments of health-related quality of life [measured by the Short Form-36 Health Status (SF-36) and its physical component summary (PCS) and mental component summary (MCS) scores]. Health resource use is determined by a standardized measure that inquires about health service use, including self-reported number of physician visits, over the previous year. This tool has been validated for various rheumatic diseases[4,5].

The cohort was begun in the fall of 2004, and measurement of health resource use was introduced in late 2005 at most centers (this was delayed until early 2006 at some centers, for logistical reasons). In our analyses, we examined cross-sectional data from 397 patients who provided information on visits to physicians, either at study entry or at their 1-year followup visit. This excludes 21 patients entering the cohort in early 2006, at the centers that were late in implementing the health resource-use questionnaire; at the time of our analyses, these patients had not yet been scheduled for their 1-year followup visits and thus there were no available data on health service use. The individuals excluded were similar to those included, in terms of age, sex, and clinical characteristics (data not shown).

In the primary analyses, we assessed the independent effects of age, sex, race/ethnicity, education, income, comorbidity, disease duration, degree of skin involvement (modified Rodnan skin score, range 0–51)[6], and health status (SF-36 PCS and MCS scores) on annual number of physician visits. These independent variables were chosen since they are all believed to be important determinants of physician use and/or medical cost in rheumatic diseases such as rheumatoid arthritis[7]. Additional sensitivity analyses were performed, substituting limited versus diffuse disease for skin score (since the 2 are highly correlated). As there is reason to believe individuals with severe organ involvement may be greater users of health resources, we also performed sensitivity analyses including variables to identify the presence or absence of significant organ involvement, including elevated estimated pulmonary artery pressure (> 40 mm Hg on echocardiogram) and renal and lung involvement, as defined[8].

Given the non-normal distribution of the data, we dichotomized the outcome, defining patients as high physician-users if they reported more than the median number (6) of physician visits over the past year. Multivariate logistic regressions containing the above variables were then performed with SAS version 9.1.3, using the PROC LOGISTIC command with the STRATA option specified to account for data clustering by study centers.

RESULTS

The study subjects were 88.7% (n = 352) female and the average age was 54.4 (SD 12.0, median 55) years. The majority of subjects (n = 355, 89.4%) were White, with 27 (6.8%) of Aboriginal origin, 6 (1.5%) Asian, 3 (0.8%) Black, and the remainder of other race/ethnicity. Mean disease duration was 9.7 (SD 8.7, median 7.1) years and the average total body skin scale score was 10.3 (SD 9.5, median 7.0; Table 1).

On average, patients reported 3.8 visits per year to specialty physicians (SD 4.2, range 0–27) and 3.5 visits per year to family physicians (SD 4.3, range 0–52). The median number of total physician visits per year was 6.0, and 25% of the sample reported 10 or more physician visits per year. Regarding specialty visits, patients reported an average of 2.4 visits a year to a rheumatologist and an average of 1.3 visits a year to nonrheumatology internal medicine specialists/subspecialists.

Our primary logistic regression analyses identified higher income, low PCS scores, high skin scores, and greater comorbidity as associated with physician use (Table 1). In secondary analyses, no interactions were seen among demographic and clinical factors (data not shown). Additional regression analyses, substituting limited versus diffuse disease for skin score, suggested more physician visits among individuals with diffuse disease (OR 1.31, 95% CI 0.81, 2.11). Including pulmonary hypertension and lung and renal involvement in the regression did not provide independent predictive value when our health status measures were present in the model, since significant organ involvement tended to correlate with poor health status scores.

DISCUSSION

Our data confirmed that individuals with SSc use a high volume of physician services. This was particularly true for specialty visits; specialists are accessed by only about 11% of the adult Canadian population in general[9]. Lower PCS scores, higher skin scores, and greater comorbidity were all independently associated with average annual physician visits.

The economic burden of SSc has only rarely been addressed[2,10]. Annual medical costs (direct and indirect) of SSc in the United States have been estimated at $1.5 billion, and physician services represent at least 10% of that total[2]. An Italian study also suggested high medical costs in SSc, estimating an average yearly patient cost of 11,073.99 Euro ($17,948) per year[10]. Over 10% of this cost related to medical visits; higher medical costs were associated with high skin scores and with poor health status[10]. This concurs with studies of nonscleroderma patients, where need or perceived need drives physician use[11-13]. As expected, comorbidity also drove physician use in our sample.

Our study has considerable strengths, including the use of a very large cohort of unselected patients with confirmed SSc, with detailed information on clinical variables and outcomes collected using validated, standardized questionnaire. However, potential limitations of our study must be acknowledged. Our data were cross-sectional, and thus associations cannot be attributed to cause and effect. However, future analyses will be able to take advantage of longitudinal measures. We excluded patients who were not administered the health resource-use questionnaire due to the late implementation of this measure, but we believe that the likelihood of systematic bias due to this is small, and we note that these excluded individuals did not appear to differ from our study subjects in terms of demographic and clinical factors. We acknowledge that our report of health resource use was by self-report, as is most often the case in observational studies. However, although it has been sug-

Table 1. Multivariate odds ratios: effects of demographic and clinical variables on high use of physicians (≥ 6 visits per year*) in persons with scleroderma (n = 397).

Variable	N (%)	Odds Ratios (95% CI)
Demographic		
Age ≥ 55 yrs	210 (52.9)	1.04 (0.64, 1.68)
Female	352 (88.7)	1.01 (0.49, 2.12)
Aboriginal race/ethnicity**	27 (6.5)	1.393 (0.54, 3.31)
College/university educated***	117 (29.4)	1.18 (0.70, 1.99)
Income ≥ $50,000 Cdn per year****	193 (48.6)	1.68 (1.05, 2.68)
Clinical factors and measures	Mean (SD)	
Duration† of scleroderma, yrs	9.7 (8.7)	1.01 (0.99, 1.04)
SF-36 Physical Component Summary †† score	38.1 (9.9)	0.94 (0.92, 0.97)
SF-36 Mental Component Summary score	49.4 (10.7)	1.00 (0.97, 1.02)
Total body skin scale†††	10.3 (9.5)	1.02 (1.00, 1.05)
Self-administered comorbidity questionnaire††††	4.4 (4.3)	1.1 (1.03, 1.17)

* Median number of annual physician visits in the sample was 6. ** Compared to Caucasians. The majority (89.4%, n = 355) of the subjects were White, 27 were Aboriginal, 6 were Asian, 3 were Black, and the remainder were of other racial/ethnicity. *** Any post-secondary education in a college or university, regardless of whether degree was obtained. **** Median value for salary was $50,000 Cdn per annum. † Dichotomizing SSc duration at the median value of 7 years or more, the OR for longer duration of systemic sclerosis was 1.03 (95% CI 0.65, 1.63).†† Higher scores are associated with better health, thus a relative risk < 1.0 indicates lower PCS scores, and poorer health, as a correlate of physician use. Dichotomizing the PCS score at the median value, PCS scores < 38 were associated with an OR of 2.60 (95% CI 1.62, 4.17). ††† Modified Rodnan skin score, ranging from 0–51; continuous variable. †††† Categorical variable for number of comorbid conditions reported by subject.

gested that patients may tend to under-report their actual number of visits[14], the likelihood of bias caused by differing demographic factors has been shown to be low[15].

We provide new data on volume of physician services, and their predictors, in SSc. Future work planned in the Canadian Scleroderma Research Group cohort will provide an even greater understanding of the social and economic burden of this complex and potentially devastating disease.

REFERENCES

1. Cooper GS, Stroehla BC. The epidemiology of autoimmune diseases. Autoimmun Rev 2003;2:119-25.
2. Wilson L. Cost-of-illness of scleroderma: the case for rare diseases. Semin Arthritis Rheum 1997;27:73-84.
3. Sangha O, Stucki G, Liang MH, Fossel AH, Katz JN. The Self-Administered Comorbidity Questionnaire: a new method to assess comorbidity for clinical and health services research. Arthritis Rheum 2003;49:156-63.
4. Lacaille D, Clarke AE, Bloch DA, Danoff D, Esdaile JM. The impact of disease activity, treatment and disease severity on short-term costs of systemic lupus erythematosus. J Rheumatol 1994;21:448-53.
5. Clarke AE, Zowall H, Levinton C, et al. Direct and indirect medical costs incurred by Canadian patients with rheumatoid arthritis: a 12 year study. J Rheumatol 1997;24:1051-60.
6. Clements PJ, Lachenbruch PA, Seibold JR, et al. Skin thickness score in systemic sclerosis: an assessment of interobserver variability in 3 independent studies. J Rheumatol 1993;20:1892-6.
7. Michaud K, Messer J, Choi HK, Wolfe F. Direct medical costs and their predictors in patients with rheumatoid arthritis: a three-year study of 7,527 patients. Arthritis Rheum 2003;48:2750-62.
8. Medsger TA Jr, Silman AJ, Steen VD, et al. A disease severity scale for systemic sclerosis: development and testing. J Rheumatol 1999;26:2159-67.
9. Statistics Canada. Access to health care services in Canada. Jan-Dec 2005. Catalogue no. 82-575-XWE2006002. Ottawa: Statistics Canada; 2006.
10. Belotti MA, Zeni S, Cossutta R, Soldi A, Fantini F. Cost-of-illness in systemic sclerosis: a retrospective study of an Italian cohort of 106 patients. Reumatismo 2003;55:245-55.
11. McIsaac W, Goel V, Naylor D. Socio-economic status and visits to physicians by adults in Ontario, Canada. J Health Serv Res Policy 1997;2:94-102.
12. Finkelstein MM. Do factors other than need determine utilization of physicians' services in Ontario? Can Med Assoc J 2001;165:565-70.
13. Iron KS, Manuel DG, Williams J. Using a linked data set to determine the factors associated with utilization and costs of family physician services in Ontario: effects of self-reported chronic conditions. Chronic Dis Can 2003;24:124-32.
14. Roberts RO, Bergstralh EJ, Schmidt L, Jacobsen SJ. Comparison of self-reported and medical record health care utilization measures. J Clin Epidemiol 1996;49:989-95.
15. Ritter PL, Stewart AL, Kaymaz H, Sobel DS, Block DA, Lorig KR. Self-reports of health care utilization compared to provider records. J Clin Epidemiol 2001;54:136-41.