Work Productivity Losses of Systemic Lupus Erythematosus (SLE) in a U.S. Commercially Insured Population

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OBJECTIVE

- To assess the indirect health-related productivity losses in newly diagnosed patients with SLE within a commercially insured population in the U.S.

CONCLUSIONS

- Patients with newly diagnosed SLE were associated with significant productivity losses compared with the non-SLE cohort, primarily through absenteeism and short-term disability
- Differences in long-term disability between patients with and without SLE were not significant, likely due to the early stage of disease captured in the newly diagnosed cohort
- Overall, this study suggests that timely interventions are warranted to improve SLE management and reduce productivity losses
- Future research with larger and more diverse SLE cohorts, including varied employment status, is needed to more comprehensively understand the long-term patterns of disability and economic burden of SLE

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Introduction

- SLE is the most prevalent form of lupus, with an estimated 204,000 individuals diagnosed in the U.S.[1]
- SLE disproportionately affects women, who account for nearly 90% of all cases, and working-age individuals, with 65–90% of diagnoses occurring between the ages of 15 and 44 years[1,2]
- SLE is associated with significant productivity loss, including absenteeism, presenteeism, and workforce exit
  - Previous studies suggested that the productivity loss for patients with SLE could be 2.4–3.5 times higher than healthcare expenditures[3,4]
- Given the chronic nature of SLE, it remains unclear whether such productivity losses occur soon after diagnosis

Methods

Study cohort

- Data were obtained from the IBM® MarketScan® database, the IBM® MarketScan® Health Productivity and Management (HPM) database, and Medicare claims, covering the study period from January 1, 2016, to December 31, 2022 (**Table 1**)
- Two U.S. adult cohorts were defined for this study: newly diagnosed SLE and non-SLE
- Newly diagnosed patients with SLE were defined as having ≥2 outpatient claims with an International Classification of Diseases (ICD)-9/10 code for SLE and ≥30 days between claims, or ≥1 inpatient claim with an ICD-9/10 code for SLE
  - The ICD-9/10 codes used for patient selection were: 7100, M32, M321, M3210, M3211, M3212, M3213, M3214, M3215, M3219, M328, and M329
  - The index date was the first SLE diagnosis within the study period
  - Patients diagnosed with SLE 12 months or less prior to the index date and those with drug-induced SLE were excluded
- Non-SLE was defined as having no SLE claim/diagnosis during the study period and eligible for disability benefits
  - These patients had other non-SLE conditions
  - The index dates were randomly selected from the available range and randomly assigned (seed number: 100) to patients to simulate the distribution of index dates within the SLE cohort
- All patients were required to have continuous enrollment in the IBM® MarketScan® health plan and pharmacy benefits for at least 12 months before and after the index date

Outcomes

- Study outcomes, occurring during the study period, included lost working hours and salary and benefit losses due to absenteeism, and lost working days and salary and benefit losses resulting from short-term (ST) and long-term (LT) disability (**Table 2**)
- Losses related to ST and LT disability were discounted by 40%, as recommended by the Bureau of Labor Statistics and supported by previous literature[5]

Statistical analyses

- All outcomes were calculated for the post-index period and annualized before performing the regression analysis
- To balance baseline differences between the newly diagnosed SLE and non-SLE cohorts, propensity score with inverse probability of treatment weighting (IPTW) was applied
- Propensity scores were derived from a logistic regression model, controlling for index year, age at index, sex, U.S. region, and Charlson Comorbidity Index (CCI) score
- IPTW-weighted standardized mean differences (SMD) were calculated to assess the balance of baseline covariates between the two groups, with an acceptable absolute value threshold of 0.1
- An IPTW-weighted cross-sectional linear regression, controlling for index year, age at index, sex, U.S. geographical region, and CCI score, evaluated the health productivity losses associated with SLE
- All analyses were performed via the Databricks ©2024 platform; data extraction was performed using Structured Query Language (SQL) and regression analyses were conducted using R

Table 1. Sources and types of data

IBM® MarketScan® database	IBM® MarketScan® Health Productivity and Management database	Medicare claims
Inpatient visits	Absenteeism claims	Types of services
Outpatient visits	ST disability claims	Diagnoses
Demographics	LT disability claims	Service dates
Drug prescription	Workers' compensation	BLS data (wage rates, benefits)

BLS, Bureau of Labor Statistics; LT, long-term; ST, short-term

Table 2. Outcomes

Absenteeism	ST disability	LT disability
Absent hours	Absent days	Absent days
Salary & benefit loss	Salary & benefit loss	Salary & benefit loss

LT, long-term; ST, short-term. All outcomes were annualized by the number of years corresponding to the patient's IBM® MarketScan® Health Productivity and Management database eligibility within the post-index period; e.g., if eligible to receive absenteeism benefit for 2 years since the index date, absent hours were calculated as total absent hours divided by 2

Results

- A total of 13,853 newly diagnosed patients with SLE and 8,537,311 patients without SLE (non-SLE) were identified

Baseline covariates

- Overall, baseline covariates were well balanced between the two groups (**Table 3**): the groups had a similar mean age, but the SLE cohort had a greater proportion of female patients, slightly larger proportion of patients from the Northeast region, and double the mean CCI score vs the non-SLE cohort
- After propensity score weighting, all baseline covariates were balanced (IPTW-weighted SMD <0.1)

Health-related productivity losses during the study period

Patients with SLE experienced an additional 35.89 hours/year of absenteeism (P=0.012) and 9.27 more days/year of ST disability (P<0.001) compared with non-SLE (**Table 4**)

The additional salary and benefit losses for patients with SLE were USD $1,556/year for absenteeism and USD $1,958/year for ST disability (**Table 4**)

No significant differences were observed between SLE and non-SLE groups regarding LT disability outcomes

Table 3. Covariates at baseline before propensity score weighting

Covariate	All SLE (N=13,853)	All non-SLE (N=8,537,311)
Index year, n (%)		
2017	2,868 (20.7)	1,786,207 (20.9)
2018	3,098 (22.4)	1,788,111 (20.9)
2019	2,454 (17.7)	1,584,657 (18.6)
2020	2,908 (21.0)	1,775,561 (20.8)
2021	2,525 (18.2)	1,602,775 (18.8)
Age, years (SD)		
	47.3 (13.2)	45.3 (15.3)
Female, n (%)		
	12,297 (88.8)	4,479,408 (52.5)
U.S. region, n (%)*		
North-Central	2,579 (18.6)	1,951,406 (22.9)
Northeast	7,099 (51.3)	3,801,091 (44.5)
South	1,815 (13.1)	1,295,051 (15.2)
West	2,360 (17.0)	1,489,763 (17.5)
CCI score (SD)		
	1.36 (2.29)	0.68 (1.76)

CCI, Charlson Comorbidity Index; SD, standard deviation;
SLE, systemic lupus erythematosus
*Regions include the following U.S. states: North-Central: IL, IN, IA, KS, MI, MN, MO, NE, ND, OH, SD, WI; Northeast: ME, NH, VT, MA, RI, CT, NY, NJ, PA; South: AL, AR, DE, DC, FL, GA, KY, LA, MD, MS, NC, OK, SC, TN, TX, VA, WV; West: AK, AZ, CA, CO, HI, ID, MT, NV, NM, OR, UT, WA, WY

Table 4. Annualized health-related productivity losses in the post-index period

	Unadjusted health productivity losses		Adjusted health productivity losses	
Outcome	**SLE**	**Non-SLE**	**Differences (SE)**	**P-value**
Absenteeism				
Absent hours	252.2	215.5	35.9 (14.3)	0.012
Indirect cost, $	10,887	9,322	1,556 (620.2)	0.012
ST disability				
Absent days	65.4	50.3	9.3 (2.0)	<0.001
Indirect cost, $	13,531	10,421	1,958 (405.4)	<0.001
LT disability				
Absent days	78.5	95.4	-11.1 (8.1)	0.17
Indirect cost, $	16,195	19,777	-2,344 (1,662.5)	0.16

LT, long-term; SE, standard error; SLE, systemic lupus erythematosus; ST, short-term
All costs are in U.S. dollars

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