

Persistently Frequent Emergency Department Utilization Among Persons With Systemic Lupus Erythematosus

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Objective. In order to identify opportunities to improve outpatient care, we evaluated patients with systemic lupus erythematosus (SLE) who persistently frequent the emergency department (ED).

Methods. We conducted a retrospective study of patients with SLE who frequented the ED for ≥ 3 visits in a calendar year, from 2013 to 2016. Persistent users were those who met criteria for persistent use for at least 2 of the 4 years, and limited users for 1 of the 4 years. Each ED encounter was categorized as SLE-related, infection-related, pain-related, or other. We compared ED use between persistent and limited users, and analyzed factors associated with pain-related encounters among persistent users through multivariate logistic regression.

Results. We identified 77 participants who had 1,143 encounters as persistent users, and 52 participants who had 335 encounters as limited users. Persistent users accounted for 77% of ED use by patients with SLE who frequented the ED. Pain-related ED visits were more common among persistent users (32%) than limited users (18%). Among persistent users, most pain-related encounters were discharged from the ED (69%) or within 48 hours of admission (20%). Persistent users with pain-related encounters accounting for $>10\%$ of ED use were more likely to be obese, have fewer comorbid conditions, and be on long-term opioid therapy.

Conclusion. Pain is a major cause of ED use. Patients with SLE who persistently utilize the ED for pain are likely to be noncritically ill, as evidenced by frequent discharges from the ED and short-stay admissions. Patients with SLE who persistently frequent the ED for pain represent a viable target for interventions to improve outpatient quality of care.

INTRODUCTION

Systemic lupus erythematosus (SLE) is a chronic inflammatory autoimmune disorder associated with substantial socioeconomic burden and health care resource utilization. Inpatient care accounts for the largest component of direct costs (1–4). However, patients with SLE have more ED visits than hospital admissions, with 40–70% having at least 1 ED visit in a year (1–6). In addition, hospitalizations are increasingly originating from the ED (7), and approximately 20% of admissions of patients with SLE are avoidable (8). For these reasons, understanding ED utilization among persons with SLE may provide insight into drivers of both health care resource utilization and poor quality of care for SLE in the outpatient setting.

As in the general population, SLE patients with low socio-demographic status, lower education level, and poor adherence more frequently utilize the ED, and account for the majority of all

ED visits (9). The definition of frequent ED use is variable, but frequent ED users generally account for 4.5–8% of all ED patients and 21–28% of all ED visits (10). Frequent ED use has been generally thought to arise from difficulty in access to primary or specialty care (11,12). However, studies show that most frequent ED users have insurance coverage and are more likely to utilize all existing forms of health care resources including outpatient care (9,10,13–15). In addition, there is evidence to suggest that the use of ED, for most people, is an affirmative choice over other sources of health care rather than a last resort (16).

It is increasingly recognized that frequent ED users are not a homogenous population (10,17,18). In the general population, studies have demonstrated that most individuals cease to qualify as frequent ED users within a year (17,19). This brief period of frequent ED use may be due to an acute event requiring multiple ED visits, pregnancy-related complications, or flare of a chronic dis-

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SIGNIFICANCE & INNOVATIONS

- Systemic lupus erythematosus (SLE) is associated with substantial socioeconomic burden and health care resource utilization. SLE patients with low socioeconomic status, irrespective of their access to care, frequent the emergency department (ED). This pattern of ED use suggests a gap in the care of SLE.
- Increasingly, it is recognized that frequent ED use is not a stable phenomenon. Most patients who utilize the ED at a high rate only experience a brief period of frequent ED use (<12 months); however, a subgroup continue to frequent the ED for years.
- Understanding persistently frequent ED use in SLE can help provide insight into opportunities to reduce health care resource utilization and improve quality of care.

ease. In contrast, a small but consistent percentage persistently frequent the ED for years (17,19). Causes and, therefore, interventions for this subgroup of patients are likely to be different than for those with a brief period of frequent ED use. Understanding the factors underlying persistently frequent ED use may help inform interventions to improve chronic disease management and care coordination in the outpatient setting.

In this study, we sought to identify patients with SLE who persistently frequented the ED throughout a 4-year period. We examined the characteristics and patterns of ED utilization at the individual patient- and encounter-levels. Our research aimed to answer the following questions: What are the demographic and disease characteristics of patients with SLE who persistently frequent the ED? How do persistently frequent users compare to those with limited frequent ED use? Is persistently frequent ED use associated with certain comorbidities, in particular, chronic pain?

PATIENTS AND METHODS

Subjects. We performed an electronic health record (EHR)-based query in Epic software for a cohort for which International Statistical Classification of Diseases and Related Health Problems, Tenth Revision code of M32 for SLE was entered at least once in either the problem list, encounter diagnosis, or as a billing code during the study period between January 1, 2013 and December 1, 2016, and who met criteria for persistently frequent ED use. Persistently frequent ED use was defined as having >3 ED visits during the 12-month calendar year, similar to previous studies on ED utilization among persons with SLE (9), for at least 2 of the 4 years during the study period, consecutive or nonconsecutive, between 2013 and 2016, at a large urban tertiary medical center.

We then verified the diagnosis of SLE through in-depth EHR review. Only those who met American College of Rheumatology criteria for SLE (20), or had SLE documented by a rheumatologist, nephrologist, or dermatologist, or were on active immunosup-

pressive therapy treatment for no other medical condition, were determined to have a verified diagnosis of SLE and were included in the study.

For those diagnosed with SLE during the study period, we reviewed and censored ED encounters preceding the diagnosis unless diagnosis of SLE was probable at the time of visit based on physician documentation and/or serologic evaluation. We then reevaluated the number of ED encounters for these newly diagnosed patients with SLE to ensure that they still met criteria for persistently frequent ED use after removal of censored visits. In instances of patient death prior to close of the study period, we reviewed the number of ED visits from study inception to time of death to ensure fulfillment of criteria for persistently frequent ED use.

To understand the comparative magnitude and pattern of ED utilization among persistently frequent users, we performed a second EHR-based query and applied the same criteria to verify diagnosis of SLE and number of ED encounters, in order to identify SLE patients who had limited frequent ED use. Limited use was defined as meeting criteria for frequent ED use for 1 out of the 4 years during the study period.

The study protocol was approved by the Human Research Protection Program at our institution. We collected patient- and encounter-level data through retrospective in-depth physician review of the EHR, using a standardized data abstraction template.

Patient-level measures. We collected demographic information including age, sex, and race/ethnicity. Zip code information was collected in order to calculate the Area of Deprivation Index (ADI) (21). The ADI is a geographic area-based measure of socioeconomic deprivation (22). It combines 17 different indicators of socioeconomic status, including level of education, income, employment, value of assets, and poverty level derived from decennial census data. Higher ADI values represent greater deprivation. We also queried the EHR for primary insurance coverage at time of enrollment, and categorized type of insurance as Medicaid, Medicare, or private/commercial.

We collected information on SLE history, including manifestations, disease duration, and organ involvement prior to the index encounter through in-depth retrospective EHR review. For those with lupus nephritis, we reviewed treatment history, and/or active renal replacement therapy through either hemodialysis or peritoneal dialysis, and/or transplant status. Information related to lupus disease activity at time of ED encounter was not consistently available in the EHR. We also collected medication history, including exposure to glucocorticoids, hydroxychloroquine (HCQ), and/or additional disease-modifying antirheumatic drugs (DMARDs), such as azathioprine, methotrexate, and mycophenolate mofetil. We categorized long-term opioid therapy as having prescription for daily or near-daily use of opioids for at least 90 days, or total days of opioid supply >120 days (23,24). We also collected information on relevant medical comorbidities including depression.

Encounter-level measures. We classified disposition of each encounter as discharged from the ED or admitted to the hospital. For encounters resulting in ED-initiated admission, we obtained information on initial admission floor status (i.e., observation, medical/surgical floor, step down unit [SDU], intensive care unit [ICU]) and length of stay in the hospital (number of days). We categorized ED-initiated admissions without a claims code for ED critical care, not admitted to the SDU/ICU, and discharged within 48 hours as potentially avoidable short-stay (PASS) admissions.

We categorized each ED encounter as SLE-related, infection-related, pain-related, or "other." This categorization was applied after discharge, either from the ED or after ED-initiated admission. We classified encounters into 1 of these 4 groups based on the principal discharge diagnosis, which was supported by physician documentation and diagnostic evaluation results. An encounter was classified as being SLE-related if a patient presented with an SLE flare or SLE-related disease activity, and/or was prescribed glucocorticoids, HCQ, or other DMARDs during the encounter by a rheumatologist, nephrologist, or dermatologist. An encounter was classified as infection-related if a patient had positive culture, or imaging diagnostic of infection, and received antibiotics in either the ED or on discharge. An encounter was classified as pain-related if the primary discharge diagnosis was for pain not attributable to SLE, trauma, or without a specific etiology or organic cause based on unremarkable diagnostic evaluation (e.g., no changes in electrocardiogram, no elevation in troponin, no abnormal imaging), and without indication for invasive or surgical intervention. By study definition, categories of SLE- and pain-related encounters were mutually exclusive; however, an encounter could be infection-related and SLE- or pain-related. For those few cases ($n = 8$), the encounter was classified according to the principal discharge diagnosis. Encounters that were not related to SLE, infection, or pain were classified as "other" (see Supplementary Tables 1 and 2, available on the *Arthritis Care & Research* web site at <http://onlinelibrary.wiley.com/doi/10.1002/acr.23777/abstract>).

Analyses. Demographic and disease characteristics were described using mean \pm SDs and proportions, as appropriate. We compared the distribution of encounters by category group at discharge from either the ED or after ED-initiated admission. In addition, for ED encounters that led to admission, we analyzed the length of stay and initial admission floor status to identify PASS admissions.

We also compared sociodemographic and disease characteristics between patients with SLE who persistently frequented the ED during the study period to those who had limited frequent ED use, using *t*-test for continuous measures and either the chi-square test or Fisher's exact test for categorical measures. Variables with *P* value < 0.1 or with clinical significance were then included in a multivariate logistic regression model. The same analytic approach was conducted to assess factors related to higher propensity to utilize the ED for pain-related encounters among

patients with SLE who persistently frequent the ED. We compared a group of persistent users who had pain-related encounters accounting for $>10\%$ of their total ED use to those for whom pain-related encounters constituted $\leq 10\%$ of ED use. Data were analyzed using Stata, version 14.2.

RESULTS

Subject characteristics. We initially identified 187 participants with possible SLE who met criteria for persistently frequent ED use, and 132 who met criteria for limited frequent ED use from 2013 to 2016, through EHR query. After in-depth retrospective EHR review to verify diagnosis of SLE, and to censor ED encounters for dates of SLE diagnosis and death, 77 participants with SLE met all inclusion criteria for persistently frequent ED use and 52 met all inclusion criteria for limited frequent ED use during the study period (see Supplementary Appendix 1, available on the *Arthritis Care & Research* web site at <http://onlinelibrary.wiley.com/doi/10.1002/acr.23777/abstract>).

Overall ($n = 129$), most of the participants were young African American women ($n = 77$ [59.7%]) with a mean \pm SD age of 41.5 ± 15.6 years. All had some form of insurance, with most having Medicaid or Medicare as their primary coverage ($n = 106$ [82.2%]). ADI score was higher compared to the region (mean \pm SD 87.3 ± 26.7), reflecting higher neighborhood socioeconomic deprivation. Most were being treated with glucocorticoids (74.4%) and/or some form of DMARD (89.1%) during the study period.

Characteristics for persistent and limited users are presented in Table 1. Approximately 1 in 3 persistent users (31.2%) and 1 in 5 limited users (19.2%) had diagnosis of depression. Long-term opioid therapy was nearly 3 times more prevalent among persistent users (37.7%) than limited users (13.5%). More persistent users had renal involvement on dialyses (19.5%) compared to limited users (5.8%).

In multivariate analysis, patients with SLE who persistently frequented the ED were more likely to be African American, have Medicare as their primary insurance coverage, be treated with dialysis, and be receiving long-term opioid therapy, compared to those with limited frequent ED use (Table 2).

ED encounters in persistently frequent versus limited frequent users. The 77 patients with SLE who persistently frequented the ED had 1,143 ED encounters and the 52 patients with limited frequent ED use had 335 ED encounters. Persistent users had more than twice the average number of ED encounters (mean $14.8 \pm$ SD 8.8) compared to limited users (mean \pm SD 6.4 ± 2.0) during the study period ($P < 0.001$). Patients with SLE who persistently frequented the ED had more encounters that led to ED-initiated admission (48.6%) than limited users (39.7%) ($P = 0.004$). More encounters were pain-related among those who persistently used the ED (32.4%) compared to those with limited use (18.2%) ($P < 0.001$). On average, persistent users had a

Table 1. Demographics and disease characteristics of SLE patients who were limited and persistently frequent ED users, 2013–2016*

Variables	Persistently frequent ED use (n = 77)	Limited frequent ED use (n = 52)	P
Demographics			
Age, mean ± SD years	42.3 ± 15.4	40.3 ± 15.9	0.482
Women	70 (90.9)	46 (88.5)	0.205
Race			0.026
White	11 (14.3)	16 (30.8)	
African American	53 (68.8)	24 (46.1)	
Hispanic/Latino	13 (16.9)	12 (23.1)	
Insurance			< 0.01
Medicaid	38 (49.3)	37 (71.1)	
Medicare	28 (36.4)	3 (5.8)	
Private/commercial	11 (14.3)	12 (23.1)	
ADI score, mean ± SD†	105.6 ± 11.7	102.6 ± 10.6	0.143
Comorbidities			
Psychiatric diagnosis	27 (35.1)	17 (32.7)	0.077
Depression	24 (88.9)	10 (58.8)	0.131
Hypertension	48 (62.3)	30 (57.7)	0.597
Hyperlipidemia	14 (18.2)	18 (34.6)	0.034
Diabetes	18 (23.4)	10 (19.2)	0.575
Coronary artery disease	8 (10.4)	5 (9.6)	0.886
Cardiovascular accident	7 (9.1)	7 (13.5)	0.434
Congestive heart failure	11 (14.3)	5 (9.6)	0.430
Asthma	15 (19.5)	9 (17.3)	0.756
COPD	2 (2.6)	3 (5.8)	0.360
No. of comorbidities, mean ± SD	1.6 ± 1.5	1.7 ± 1.3	0.614
BMI, mean ± SD kg/m ²	30.4 ± 9.8	29.5 ± 7.4	0.584
Long-term opioid therapy	29 (37.7)	7 (13.5)	0.003
SLE characteristics			
Disease duration ≥10 yrs	29 (38.7)	18 (34.6)	0.642
Renal involvement	34 (44.2)	18 (34.6)	0.279
LN on dialyses	15 (44.1)	3 (16.7)	0.027
LN with transplant	7 (20.5)	3 (16.7)	0.489
Lung involvement	15 (19.5)	16 (30.8)	0.141
Pericarditis	14 (18.2)	13 (25.0)	0.350
Medication use			
None	6 (7.8)	1 (1.9)	0.149
Glucocorticoids	55 (71.4)	41 (78.8)	0.344
HCQ	59 (76.6)	45 (86.5)	0.162
Other DMARD†	39 (50.6)	34 (65.4)	0.098
AZA	15 (38.5)	16 (47.0)	0.141
MTX	8 (20.5)	10 (29.4)	0.155
MMF	24 (61.5)	15 (44.1)	0.778

* Values are the number (%) unless indicated otherwise. SLE = systemic lupus erythematosus; ED = emergency department; ADI = Area of Deprivation Index; COPD = chronic obstructive pulmonary disease; BMI = body mass index; LN = lupus nephritis.

† Sum of number of participants being treated with azathioprine (AZA), methotrexate (MTX), and mycophenolate mofetil (MMF) exceed number of participants being treated with other disease-modifying antirheumatic drugs (DMARDs; other than hydroxychloroquine [HCQ]), as some were concomitantly on >1 DMARD.

mean ± SD 4.8 ± 6.1 pain-related encounters and limited users had a mean ± SD 1.2 ± 1.4 pain-related encounters during the study period ($P < 0.001$). One in 4 persistent users (26%) had >5 pain-related encounters, whereas 1 single limited user (1.9%) had >5 pain-related encounters between 2013 and 2016 ($P < 0.001$). Infection-related (12.9%) and SLE-related (6.7%) encounters were less common among persistently frequent users compared to limited users (15.5% and 10.5%, respectively). Encounters categorized as other accounted for the majority of ED use for persistent (48.0%) and limited (56%) users.

ED utilization among SLE patients who persistently frequent the ED. The 77 patients who persistently frequented the ED accounted for 77% of all ED use by patients with SLE who had ≥3 ED visits in a calendar year between 2013 and 2016. Of the 1,143 encounters incurred by patients with SLE who persistently frequented the ED, 588 (51.4%) resulted in discharge from the ED and 555 (48.6%) led to ED-initiated admissions. A substantial portion of encounters resulting in discharge from the ED were pain-related (43.7%), some were infection-related (10.4%), and few were SLE-related (1.4%) (Figure 1). The 8 encounters

Table 2. Factors associated with persistently frequent ED use compared to limited frequent ED use*

Variable	OR (95% CI)	P
Age	0.99 (0.96–1.03)	0.966
Women	1.67 (0.40–7.03)	0.482
Race		
White	Ref.	–
African American	5.24 (1.63–16.84)	0.005†
Hispanic/Latino	2.12 (0.52–8.68)	0.295
Insurance		
Medicaid	Ref.	–
Medicare	15.77 (3.8–73.65)	<0.001†
Private/commercial	1.71 (0.57–5.15)	0.342
No. of comorbidities	0.70 (0.48–1.01)	0.061
Depression	1.97 (0.66–5.82)	0.222
Long-term opioid therapy	3.09 (1.02–9.38)	0.046†
Renal involvement on dialysis	5.03 (1.06–23.84)	0.042†
Other DMARD‡	0.44 (0.18–1.08)	0.075

* ED = emergency department; OR = odds ratio; 95% CI = 95% confidence interval; Ref. = reference; DMARD = disease-modifying antirheumatic drug.

† Significant at $P < 0.05$.

‡ DMARDs other than hydroxychloroquine.

categorized as SLE-related on discharge from the ED involved evaluation either by a rheumatologist or a nephrologist during the ED course, and had documentation to support findings of SLE-related activity/complications in the EHR. Among encounters resulting in ED-initiated admission, 20.4% were pain-related, 15.5% were SLE-related, and 12.4% were infection-related.

Among encounters that led to ED-initiated admission, the majority of pain-related encounters (65.5%) resulted in admission with discharge within 48 hours and were significantly more likely than any other encounter category group to meet criteria for PASS admissions ($P < 0.001$). Infection-related encounters were least likely to lead to admission with discharge within 48 hours (19.8%), and were more often initially admitted to the SDU/ICU (12.8%). In

comparison, 43.5% of SLE-related encounters resulted in admissions with discharge within 48 hours. Among the 56.5% of SLE-related encounters resulting in ED-initiated admissions with a length of stay longer than 48 hours, 10.3% were initially to the SDU/ICU.

The number of participants having at least 1 ED visit related to each encounter category group varied. Thirty-two participants (41.6%) had ≥ 1 SLE-related encounters, 55 participants (71.4%) had at least 1 infection-related encounter, and 61 participants (79.2%) had at least 1 pain-related encounter. All patients had at least 1 ED encounter classified as “other.”

Patient characteristics associated with pain-related encounters among SLE patients who persistently frequent the ED.

We observed a high burden of pain among patients with SLE who persistently frequented the ED, with 50.7% of encounters coding pain as the chief concern at initiation of the ED encounter. Pain was the presenting symptom for 51 (66.2%) of SLE-related encounters, 38 (25.8%) of infection-related encounters, and 171 (31.1%) of “other” encounters. Of the 580 encounters with pain symptoms reported at presentation, 320 (55.2%) were categorized as pain-related encounters upon discharge. These pain-related encounters, as aforementioned, accounted for one-third of ED use by patients with SLE who persistently frequented the ED, representing 61 participants (79.2%). We observed a wide range in the frequency of pain-related encounters among participants with at least 1 pain-related encounter. One participant had a single pain-related encounter, whereas another had 31 pain-related encounters during the study period.

In order to understand factors associated with higher propensity to utilize the ED for pain, we compared characteristics of participants who had pain-related encounters accounting for $>10\%$ of their total ED use to those with pain-related encounters accounting for $\leq 10\%$ of their total ED use (Table 3). Participants with higher propensity to persistently frequent the ED for pain-related encoun-

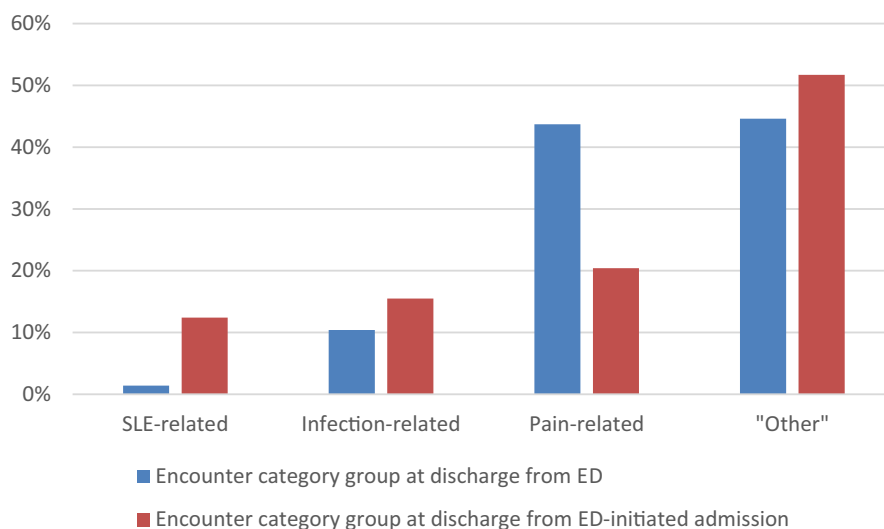


Figure 1. Proportion of emergency department (ED) encounters in each encounter category group at discharge from either the ED or after ED-initiated admission among patients with systemic lupus erythematosus (SLE) who persistently frequented the ED from 2013 to 2016.

Table 3. Comparison of patient characteristics with various degrees of pain-related encounters among SLE patients who persistently frequented the ED*

Variables	Pain-related ED encounters ≤10%	Pain-related ED encounters >10%	P
Participants	24 (31.2)	53 (68.8)	–
Demographics			
Age, mean ± SD years	48.0 ± 18.4	39.7 ± 13.2	0.028
Women	22 (91.7)	48 (90.6)	0.623
Race			0.001
White	5 (20.8)	6 (11.3)	
African American	10 (41.7)	43 (81.1)	
Hispanic/Latino	9 (37.5)	4 (7.6)	
Insurance			0.892
Medicaid	12 (50.0)	26 (49.1)	
Medicare	8 (33.3)	20 (37.7)	
Private/commercial	4 (16.7)	7 (13.2)	
ADI score, mean ± SD	100.8 ± 10.7	107.7 ± 11.6	0.016
Comorbidities			
Hypertension	17 (70.8)	31 (58.5)	0.218
Hyperlipidemia	8 (33.3)	6 (11.3)	0.028
Diabetes mellitus	9 (37.5)	9 (17.0)	0.049
Coronary artery disease	4 (16.7)	4 (7.5)	0.205
Congestive heart failure	8 (33.3)	3 (5.7)	0.003
Cerebrovascular accident	4 (16.7)	3 (5.7)	
COPD	2 (8.3)	0 (0.0)	0.094
Asthma	4 (16.7)	11 (20.7)	0.467
No. of comorbidities, mean ± SD	2.3 ± 2.0	1.3 ± 1.1	0.019
Depression	10 (41.7)	14 (26.4)	0.181
Long-term opioid therapy	5 (20.8)	24 (45.3)	0.040
BMI, mean ± SD kg/m ²	27.3 ± 6.9	31.8 ± 10.6	0.058
SLE disease characteristics			
Disease duration ≥10 years	7 (50.0)	23 (54.8)	0.757
Renal involvement	13 (54.2)	21 (39.6)	0.234
LN on dialyses	9 (69.2)	6 (28.6)	0.024
LN with transplant	1 (7.7)	5 (23.8)	0.237
Medication use			
Glucocorticoids	16 (66.7)	39 (73.6)	0.534
Hydroxychloroquine	16 (66.7)	43 (81.1)	0.165
Other DMARD†	8 (33.3)	31 (58.5)	0.041

* Values are the number (%) unless indicated otherwise. SLE = systemic lupus erythematosus; ED = emergency department; ADI = Area of Deprivation Index; COPD = chronic obstructive pulmonary disease; BMI = body mass index; LN = lupus nephritis; DMARD = disease-modifying antirheumatic drug.

† DMARDs other than hydroxychloroquine.

ters were younger ($P = 0.028$), more likely to be African American ($P = 0.001$), and came from more socioeconomically deprived neighborhoods ($P = 0.016$). No difference in the prevalence of depression was observed, although, long-term opioid therapy was more common in this group ($P = 0.040$). In addition, participants with >10% pain-related encounters had fewer comorbid conditions ($P = 0.019$) and were more likely to be treated with DMARDs rather than HCQ ($P = 0.041$). In multivariate analysis, African Americans, fewer comorbid conditions, long-term opioid therapy, and higher BMI were associated with higher propensity to utilize the ED for pain (Table 4).

Characteristics of SLE patients who persistently frequent the ED with pain-related PASS admissions. One in 5 hospitalized encounters were pain-related upon discharge from ED-initiated admission among patients with SLE who per-

sistently frequented the ED, of which 74 encounters (65.6%) met criteria for PASS admissions. Table 5 shows the 25 participants (32.5%) who accounted for the 74 pain-related PASS admissions. All of the 25 participants were female except one. The mean ± SD age was 38.4 ± 13.8 years, 18 (72%) were African American, 5 (20%) were white, and 2 (8%) were Hispanic. All participants had some form of insurance; 24 (96%) had public insurance (either Medicaid or Medicare) and only 1 (4%) had private/commercial insurance as their primary insurance. Of the 25 persistent users with pain-related PASS admissions, 13 (52.0%) were on long-term opioid therapy. Even within this subgroup of participants, heterogeneity in the frequency of pain-related PASS admissions was observed. Fourteen participants (56%) had ≤2 pain related PASS admissions, whereas 1 participant accounted for 10 (13.5%) of these encounters. Overall, the 25 persistently frequent ED users with pain-related PASS admissions constituted

Table 4. Patient characteristics associated with higher propensity to utilize the ED for pain among SLE patients who persistently frequented the ED*

Variables	OR (95% CI)	P
Age	1.00 (0.95–1.06)	0.870
Race		
African American	Ref.	–
White	0.25 (0.02–3.09)	0.283
Hispanic	0.02 (0.00–0.17)	<0.001
Area of Deprivation Index	1.05 (0.98–1.12)	0.201
No. of comorbidities	0.54 (0.33–0.89)	0.015
Long-term opioid therapy	7.50 (1.19–47.43)	0.032
BMI	1.12 (1.01–1.24)	0.034
Other DMARD use†	2.55 (0.50–12.97)	0.258

* ED = emergency department; SLE = systemic lupus erythematosus; OR = odds ratio, 95% CI = 95% confidence interval; BMI = body mass index; DMARD = disease modifying antirheumatic drug.

† DMARDs other than hydroxychloroquine.

one-third of the study participants and accounted for 43.8% of all ED encounters.

DISCUSSION

To our knowledge, this is the first study to characterize persistently frequent ED use among patients with SLE. In this study, patients with SLE who frequented the ED were mostly young Afri-

can American females, all of whom had some form of insurance. Persistent users were more likely to have Medicare as their primary insurance and be on long-term opioid therapy compared to limited users. Medicare was associated with persistent use when adjusted for age, and may be confounded by dialysis status and other factors unaccounted for in this study that relate to permanent disability or disability benefit status, which are eligibility criteria for Medicare coverage. Long-term opioid therapy and depression were each observed in 1 in 3 patients with SLE who persistently frequented the ED.

In this study, persistent users disproportionately utilized the ED compared to limited users, and mostly for non-lupus-related pain reasons. Chronic pain, a symptom frequently experienced by patients with SLE (25,26), was a major cause of ED utilization and ED-initiated admissions among patients with SLE who persistently frequented the ED. These patients were more likely to be non-critically ill, as evidenced by frequent discharge from the ED and PASS admissions. And thus, SLE patients who persistently frequent the ED for chronic pain represent a viable and high-impact target for early intervention and education to improve chronic care management and coordination.

Lessons on how to improve the delivery of care to patients with SLE may be learned from other chronic diseases, such as sickle cell anemia. Sickle cell and SLE share certain character-

Table 5. Characteristics of 25 persistently frequent ED users with pain-related PASS admissions and pattern of ED utilization during the study period*

Patient ID	Age	Sex	Race/Ethnicity	Insurance	ADI	LTOT	No. pain PASS	Total ED visit	No. SLE-related	No. infection-related	No. pain-related	No. other †
P01	22	F	AA	Medicaid	108.73	Yes	1	31	11	1	5	16
P02	21	F	AA	Medicaid	107.47	Yes	9	41	1	1	26	13
P03	46	F	AA	Medicaid	115.60	Yes	1	17	2	2	12	1
P08	33	F	AA	Medicare	114.64	Yes	2	11	1	0	3	7
P09	36	M	AA	Medicare	115.60	Yes	5	31	7	0	23	1
P10	28	F	AA	Medicaid	109.07	Yes	4	37	2	1	15	19
P15	51	F	AA	Medicaid	108.24	No	5	12	0	1	9	2
P16	22	F	AA	Medicare	126.32	No	1	18	1	4	3	10
P21	36	F	AA	Medicaid	111.65	No	3	11	2	1	5	3
P23	44	F	Hispanic	Medicaid	96.64	No	1	10	1	2	1	6
P26	36	F	White	Medicaid	89.39	Yes	10	42	0	1	32	9
P27	22	F	AA	Medicaid	103.25	No	1	13	2	1	9	1
P29	27	F	AA	Medicaid	86.08	No	3	21	2	6	12	1
P32	39	F	AA	Medicaid	116.35	No	1	10	0	4	3	3
P34	67	F	AA	Medicare	102.61	No	2	11	0	0	9	2
P36	37	F	AA	Medicare	126.82	No	2	10	0	3	5	2
P43	48	F	White	Medicaid	108.86	Yes	4	19	2	3	11	3
P44	39	F	AA	Medicare	107.10	Yes	6	22	2	1	14	5
P49	60	F	White	Medicare	81.76	Yes	1	11	0	3	4	4
P54	72	F	AA	Medicare	116.71	Yes	1	7	0	0	4	3
P58	47	F	AA	Priv./Comm.	97.76	No	1	10	0	1	3	6
P62	32	F	AA	Medicaid	112.22	Yes	1	19	2	0	10	7
P65	30	F	Hispanic	Medicaid	115.60	No	1	9	0	0	6	3
P69	24	F	White	Medicare	109.09	Yes	4	49	0	6	8	35
P73	40	F	White	Medicare	101.70	No	4	29	5	3	17	4

* ED = emergency department; PASS = pain-related potentially avoidable short-stay admissions; ADI = Area of Deprivation Index; LTOT = long-term opioid therapy; SLE = systemic lupus erythematosus; AA = African American; Priv./Comm. = private/commercial.

† Encounters that were not related to SLE, infection, or pain.

istics in that both are complex chronic diseases, with periods of exacerbation, which disproportionately affect young African Americans and are frequently associated with chronic pain. Outpatient pain has been shown to be predictive of ED utilization among patients with sickle cell disease and intensive ambulatory management with frequent outpatient visits has been successful in reducing health care resource utilization (27–29). However, despite projected therapeutic efficacy and cost-effectiveness of ambulatory chronic pain management, compliance with and sustained improvement of health care resource utilization through nonpharmacologic pain management may be challenging. Studies have identified poor social support and communication with providers, limitation of financial and transportation resources, reliance on opioids, and lack of belief in and inadequacy of pain control as barriers to multimodality pain management (30–33). For these reasons and because of findings showing that regardless of access to care, some patients continue to preferentially utilize the ED for ambulatory care-sensitive conditions (such as chronic pain [16,34,35]), ED-based interventions for chronic pain management (such as case management, use of chronic pain protocols, and pain specialist consultation in the ED) should be developed to complement outpatient services. Some studies have explored the use of individualized home pain management programs and community health workers who provide social support, navigation of health systems and resources, and counseling, for the management of chronic pain in sickle cell disease (36,37). Web-based nonpharmacologic interventions may also be a viable option for chronic pain management in young patients with SLE, who have ready access to and familiarity with technology, but often limited access to outpatient specialty pain clinics (38–41).

This study has several limitations. Findings are based on a small number of participants at a single tertiary medical center. The cohort of patients with SLE who persistently frequented the ED, however, is expected to be small, as frequent ED users typically consist of 4.5–8% of all ED patients, and persistently frequent ED users are a smaller subgroup of this population (10,17). In addition, the criteria to confirm diagnosis of SLE was designed to have high specificity for this study, further limiting the size of the cohort. In future studies, utilization of validated EHR-based search algorithms with high positive predictive value to identify SLE patients would increase both generalizability and reproducibility. Although based on a small cohort, this study included a comparison cohort, incorporated a substantial number of unique ED encounters, and detailed information on patient- and encounter-level variables for each visit that were obtained through retrospective in-depth physician chart review. However, because data on lupus-related disease activity (either through validated or laboratory measures) at time of each ED encounter were not consistently available, we were unable to assess the relationship between SLE disease activity, pain, and ED utilization. Findings from this study would be strengthened by conducting key informant qualitative interviews. Patients with SLE who persistently frequent the ED can

be engaged to elicit their perception of, and barriers to, ambulatory care coordination and chronic pain management (as relevant). Clinical impression at time of care transition from the ED and factors influencing physician decision for admissions can inform understanding of ED-initiated admissions. In this study, ED encounters were categorized using a priori criteria based on the principal discharge diagnosis. Further delineation of “other” encounters, particularly those that led to ED-initiated admission and were more likely to have greater complexity and discharge diagnosis codes, may provide further insight into the burden of pain not attributable to lupus and persistently frequent ED utilization. In addition, information on health care resource utilization during admission, especially during the first 48 hours, would allow for factors associated with PASS admissions to be ascertained, and should be included in future studies to inform opportunities to reduce ED-initiated admission of noncritically ill patients with SLE and improve outpatient chronic disease management.

In conclusion, patients with SLE who persistently frequented the ED were young African American females, who were living in more economically deprived areas, and had a high burden of depression and long-term opioid therapy. Pain was a major cause of both ED utilization and ED-initiated admissions, most of which were PASS admissions. Patients with SLE who persistently frequent the ED, particularly for pain, would benefit from targeted early interventions, in both the ED and outpatient settings, to improve chronic disease management and care coordination.

AUTHOR CONTRIBUTIONS

All authors were involved in drafting the article or revising it critically for important intellectual content, and all authors approved the final version to be submitted for publication. Dr. Lee had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

Study conception and design. Lee, Suter, Fraenkel.

Acquisition of data. Lee, Lin, Fraenkel.

Analysis and interpretation of data. Lee, Suter, Fraenkel.

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