Original Report:
Health Care Delivery
and Costs

EXAMINING RACIAL DIFFERENCES IN ACCESS TO PRIMARY CARE FOR PEOPLE LIVING WITH LUPUS: USE OF AMBULATORY CARE SENSITIVE CONDITIONS TO MEASURE ACCESS

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Background: People living with lupus may experience poor access to primary care and delayed specialty care.

Purpose: To identify characteristics that lead to increased odds of poor access to primary care for minorities hospitalized with lupus.

Methods: Cross-sectional design with 2011-2012 hospitalization data from South Carolina, North Carolina, and Florida. We used ICD-9 codes to identify lupus hospitalizations. Ambulatory care sensitive conditions were used to identify preventable lupus hospitalizations and measure access to primary care. Logistic regression was used to estimate the odds ratio for the association between predictors and having poor access to primary care. Sensitivity analysis excluded patients aged >65 years.

Results: There were 23,154 total lupus hospitalizations, and 2,094 (9.04%) were preventable. An adjusted model showed minorities aged ≥65 years (OR 2.501, CI 1.501, 4.169), minorities aged 40-64 years (OR 2.248, CI: 1.394, 3.627), minorities with Medicare insurance (OR 1.669, CI:1.353,2.059) and minorities with Medicaid (OR 1.662,CI:1.321, 2.092) had the highest odds for a preventable lupus hospitalization. Minorities with Medicare had significantly higher odds for ≥3 hospital days (OR 1.275, CI: 1.149, 1.415). Whites with Medicare (OR 1.291, CI: 1.164, 1.432) had the highest odds for ≥3 days.

Conclusions: Our data show that middle-aged minorities living with lupus and on public health insurance have a higher likelihood of poor access to primary care. Health care workers and policymakers should develop plans to identify patients, explore issues affecting access, and place patients with a community health worker or social worker to promote better access to primary care.

Ethn Dis. 2020;30(4):611-620; doi:10.18865/ed.30.4.611

Keywords: Systemic Lupus Erythematosus; Hospitalizations; Access to Primary Care

INTRODUCTION

Access to primary care is a challenging concept to objectively measure; however, as health care legislation, policies, and programs are developed to address inadequacies, access to primary care remains an important aspect of health service research. In the past, researchers have often used subjective patient survey data or patient interviews to evaluate access.[1-3] Self-report data may be the best measure of an individual's access to primary care.[1] However, researchers have developed objective methods to measure access to primary care, assess quality of health care services, and evaluate health care policies.[4,5] One particular methodology involves investigating the number of preventable hospitalizations due to ambulatory care sensitive (ACS) conditions in a population or geographic area.[1,6]

Access to primary care may be a barrier to certain populations, especially those with chronic illnesses. This may be especially true in people living with systemic lupus erythematosus, commonly referred to as lupus. Lupus is a life-long, chronic illness that can affect major organs, including kidneys, heart, and lungs. Because of lupus disease characteristics, it is often difficult to diagnose in a timely manner.[7] Minorities and women face higher prevalence and incidence rates of lupus, and it appears to have more of a burden for this population. African American women experience an increased prevalence of lupus compared with Caucasian women.[8-10]

Limited access to primary care or available services combined with the increased possibility of a delayed lupus diagnosis can negatively im-

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pact health. Limited access may be compounded by states' Medicaid expansion status, particularly for those living in states that did not expand Medicaid. States that expanded Medicaid increased Medicaid income eligibility while states that did not expand had lower income eligibility making it difficult to receive Medicaid health insurance, especially for childless adults.[11] Given that African Americans often have inadequate access to primary and specialty care, and given that African Americans often exhibit high levels of distrust of the medical community and treatment,[12] African Americans living with lupus are often at elevated risk for lupus-related health problems.

> *Our research question was: What characteristics lead to increased odds of having a preventable lupus hospitalization or longer length of stay for Whites and minorities in several states that did not expand Medicaid under the ACA?*

There has been research investigating access to primary care and health care utilization in those living with lupus; however, these studies did not use preventable hospitalizations due to ACS conditions to evaluate access to primary care or utilization. In one 13-year study comparing patients with lupus to age and sex-matched controls without lupus, those with lupus had significantly more ER visits, and the ER visits were more frequent early in the disease.[13] In a systematic review examining health care utilization in lupus populations, researchers reported that all 12 studies investigating the effect of ethnicity on health care utilization found no significant association between ethnicity and utilization.[14] However, disease severity and disease activity were significantly associated with higher health care utilization.[14] Researchers in California examined access to primary care by physical distance from the patient's home to their regular lupus provider.[15] In the unadjusted analysis, they found that Medicaid patients with lupus traveled a further distance than those with other types of insurance to receive care for their condition.[15] Additionally, lupus patients with Medicaid were 2.4 times more likely to have an ER visit for lupus compared with lupus patients without Medicaid; researchers controlled for disease activity, age, education, race/ethnicity, urban residence, and distance traveled to primary lupus provider.[15]

To our knowledge, in the field of lupus research, there are only three studies that utilized preventable hospitalizations due to ACS conditions to measure access to primary care for people with lupus. One study investigated patient and hospital characteristics that increased the odds of avoidable hospitalizations in people living with lupus in the state of New York.[16] Patient characteristics associated with higher rates of avoidable hospitalizations or inadequate access to primary care were older age, Medicare insurance, and low income.[16] The second study used preventable hospitalizations and hospital charge data to evaluate Medicaid expansion under the Affordable Care Act (ACA) for people living with lupus.[11] Researchers reported, after adjustments, people living with lupus in Medicaid expansion states had higher odds of having a preventable hospitalization, and those who were older, on public health insurance, in rural areas, or low income had significantly higher odds for poor access to primary care.[11] Lastly, there is an additional study that used ACS conditions to measure access to primary care in lupus populations; however, the study focuses on lupus patients with end-stage renal disease (ESRD) to examine the incidence of ESRD in a lupus cohort.[17] While these studies used preventable hospitalizations due to ACS conditions to measure access to primary care, our study focuses solely on racial differences in access to primary care for people living with lupus.

Thus, our research question was: What characteristics lead to increased odds of having a preventable lupus hospitalization or longer length of stay (LOS) for Whites and minorities in several states that did not expand Medicaid under the ACA?

METHODS

Study Design

This study was a cross-sectional study using 2011-2012 state hospitalization data from South Carolina, North Carolina, and Florida from a large, administrative hospitalization dataset.

Source of Data

The Agency for Health Research and Quality's (AHRQ) Health care Cost and Utilization Project (HCUP) provided administrative hospital data, patient demographics, ICD-9 diagnoses codes, total charges, LOS, and expected payment source for all hospital inpatient stays in community hospitals in each state.[18] HCUP data for South Carolina (SC), North Carolina (NC), and Florida (FL) were used to identify hospitalizations. Based on data availability, NC data were from 2011; SC and FL data were from 2012. To protect patient confidentiality, actual zip codes were not available in the downloaded dataset; however, HCUP used zip code demographic data of residents in the patients' zip code to report patients' median household income.

Definition of Lupus Cases

Lupus hospitalizations were defined as a hospitalization with an ICD-9 code of 710.0 for the primary or subsequent discharge diagnosis. Within this group of lupus patient hospitalizations, preventable lupus hospitalizations were defined as a lupus hospitalization that had an ACS condition as the primary discharge diagnosis. Appropriate discharge diagnoses for lupus and ACS conditions were identified with ICD-9 codes (International Classification of Diseases, 9th Revision, Clinical Modification codes).

Ambulatory Care Sensitive (ACS) Conditions

The AHRQ has published research on ACS conditions as a validated tool to measure access to primary care.[19] Theoretically, ACS conditions are illnesses or diagnoses that, with proper primary care, hospitalizations can be avoided if the disease is appropriately managed in the community setting.[20] There is not a significant consensus among health services researchers, physicians, and methodologists regarding which ACS conditions are sensitive to quality ambulatory care.[5,20-22] However, we selected five ambulatory care "tracer conditions" as indicators of access to care for lupus patients because lupus is an autoimmune disease that may progressively deteriorate the heart and lungs and increase infections because of immune system weakening. We wanted to limit our selected admissions to a few clearly distinct conditions. We selected angina and congestive heart failure (CHF) as the heart disease tracer conditions as examples of symptomatic chronic conditions. Pneumonia and cellulitis were selected as indicators of poor access to acute care for infections. Hypertension was chosen as an indicator of poor access to primary care monitoring/management of an important, but usually asymptomatic condition.

We recognize that other conditions may be equally important, but our objective was to examine a few "tracer" conditions.

Study Variables

Race/ethnicity was categorized into two groups: 1) White and 2) minority due to small sample sizes. Minority included all Black, Hispanic, Asian or Pacific Islander, Native American, and Other. Patients were categorized into four age groups: 1) aged ≤ 19 years; 2) aged 20-39 years; 3) aged 40-64 years; and 4) aged ≥ 65 years. Expected primary payer or type of health insurance included Medicare, Medicaid, private insurance, and uninsured. HCUP median income household data were categorized into a national quartile classification. 2012 SC and FL median income data differ slightly from 2011 NC median income data. For example, 2012 SC and FL median income quartiles were $1-38,999 (25th percentile), $39,000-47,999 (50th percentile), $48,000-62,999 (75th percentile), and $63,000+ (100th percentile). However, 2011 NC median income quartiles were $48,000-63,999 (75th percentile) and $64,000+ (100th percentile). NC median income for the 25th percentiles and 50th percentiles are the same as SC and FL.

Rural-Urban Commuting Areas (RUCA), using zip code data, were used to determine urban vs rural residence.[23] RUCA data were transformed into an indicator variable where the rural variable comprised large rural town, small rural town, and isolated rural. LOS was dichotomized into two groups: 1) 0-3 days in the hospital; and 2) more than 3 days in the hospital.

Statistical Analysis

Chi-square tests were used to determine bivariate relationship of categorical data (eg, state, race, sex, age group, insurance, MHI, hospital charges, residence, and LOS) to preventable lupus hospitalization. Logistic regression was used to estimate the asso-

Table 1. Demographic characteristics for lupus hospitalizations[a]

Variable	Total lupus hospitalizations, full cohort	Non-preventable lupus hospitalizations	Preventable lupus hospitalizations	P
Hospitalizations, n (%)	23154 (100)	21060 (90.96)	2094 (9.04)	
State[b]				.4184
Florida	15136 (65.56)	13753 (65.49)	1383 (66.20)	
North Carolina	5081 (22.01)	4644 (22.12)	437 (20.92)	
South Carolina	2871 (12.44)	2602 (12.39)	269 (12.88)	
Race/ethnicity				<.001[a]
White	11551 (50.15)	10417 (49.74)	1134 (54.34)	
Minority[c]	11481 (49.85)	10528 (50.26)	953 (45.66)	
Sex				.0054[a]
Male	2519 (10.88)	2329 (11.06)	190 (9.07)	
Female	20635 (89.12)	18731 (88.94)	1904 (90.93)	
Age groups, years				<.0001[a]
0-19	650 (2.82)	623 (2.97)	27 (1.29)	
20-39	5762 (24.96)	5319 (25.33)	443 (21.21)	
40-64	11355 (49.18)	10253 (48.83)	1102 (52.75)	
≥65	5321 (23.05)	4804 (22.88)	517 (24.75)	
Health insurance				<.0001[a]
Medicare	11773 (52.83)	10594 (52.29)	1179 (58.19)	
Medicaid	4282 (19.21)	3883 (19.17)	399 (19.69)	
Private insurance	5192 (23.30)	4835 (23.87)	357 (17.62)	
Uninsured	1038 (4.66)	947 (4.67)	91 (4.49)	
Median household income, $[d]				.1912
0 - 38,999, 25th percentile	9274 (40.81)	8406 (40.65)	868 (42.40)	
39k - 47,999, 50th percentile	7524 (33.11)	6842 (33.09)	682 (33.32)	
48k - 62,999, 75th percentile	4351 (19.15)	3979 (19.24)	372 (18.17)	
≥63k, 100th percentile	1575 (6.93)	1450 (7.01)	125 (6.11)	
Hospital charges, $				<.0001[a]
0 - 20,000	7368 (31.82)	6542 (31.07)	826 (39.45)	
20,001 - 40,000	7195 (31.08)	6431 (30.54)	764 (36.49)	
40,001 - 60,000	3444 (14.87)	3179 (15.10)	265 (12.66)	
≥60,001	5146 (22.23)	4907 (23.30)	239 (11.41)	
Residence				.1694
Urban	19369 (85.89)	17646 (85.99)	1723 (84.88)	
Rural	3182 (14.11)	2875 (14.01)	307 (15.12)	
Length of Stay				<.0001[a]
0 – 3 days	10900 (47.08)	9793 (46.50)	1107 (52.87)	
4 – 7 days	7506 (32.42)	6773 (32.16)	733 (35.00)	
8 – 11 days	2456 (10.61)	2295 (10.90)	161 (7.69)	
≥12 days	2291 (9.90)	2198 (10.44)	93 (4.44)	

Data are n(%).

a. Chi-square tests conducted for categorical variables. Each sample (n) includes all nonmissing data.

b. Florida and South Carolina data are from 2012 while North Carolina data are from 2011.

c. Includes all races listed as Black, Hispanic, Asian or Pacific Islander, Native American, or Other.

d. MHI quartiles changed each year from 2012-2015. See website for more information: https://www.hcup-us.ahrq.gov/db/vars/zipinc_qrtl/nisnote.jsp.

ciation between factors and the odds of a preventable lupus hospitalization and corresponding 95%CI. We checked for an interaction between race/ethnicity and all study variables and results with significant interaction were reported by race/ethnicity. Interactions were considered significant at P<.15. We conducted a sensitivity analysis excluding patients aged ≥65 years since there may be a higher prevalence of our "tracer" ACS conditions in this population. All analyses were completed using SAS software, version 9.4 (SAS Institute, Cary, NC).

RESULTS

There were 23,154 total lupus hospitalizations, and 2,094 (9.04%) were considered preventable, suggesting poor access to primary care (Table 1). The majority of lupus hospitalizations were female (89.12%), from urban areas (85.89%), in Florida (65.56%), or on Medicare (52.83%). The majority of preventable lupus hospitalizations had the following characteristics: female (90.93%), urban residence (84.88%), Florida residence (66.20%), Medicare insurance (58.19%), or 40-64 years old (52.75%). Those hospitalizations considered preventable (indicative of poor access to primary care) had a significantly lower LOS (4.41 vs 5.72, P < .0001) and lower hospital charges ($33,774 vs $50,343, P<.0001). Of those patients aged 0-64 years old, approximately 6,762 (39.95%) had Medicare insurance, which may be indicative of kidney involvement (data not shown).

Preventable Hospitalizations

There was an interaction between race/ethnicity and age group (P=.0626) as well as race/ethnicity and rural residence (P=.1174) (data not shown). In the unadjusted model with just the two interaction terms, older minorities had significantly increased odds for a preventable lupus hospitalization compared with younger minorities (Table 2). Minorities who were aged ≥65 years had the highest odds of having poor access to care compared with the reference group (aged 0-19 years) (OR 2.807, CI 1.719, 4.583). The interaction between race and residence was no longer significant in the unadjusted analysis.

Table 2. Unadjusted odds ratios and CIs for interaction terms for preventable lupus hospitalizations [a]

Variables	Unadjusted model
Race/ethnicity*age group (interaction)	
Minorities*0-19 years	Ref
Minorities*20-39 years	1.816 (1.128, 2.922)[a]
Minorities*40-64 years	2.304 (1.441, 3.682)[a]
Minorities*≥65 years	2.807 (1.719, 4.583)[a]
Whites*0-19 years	Ref
Whites*20-39 years	1.507 (.649, 3.502)
Whites*40-64 years	1.946 (.850, 4.458)
Whites*≥65 years	1.690 (.736, 3.880)
Race/ethnicity*residence (interaction)	
Minorities*urban	Ref
Minorities*rural	1.213 (1.002, 1.470)[a]
Whites*urban	Ref
Whites*rural	.975 (.816, 1.164)

a. Indicates significant at P<.15

In adjusted analysis, we controlled for insurance type, sex, age, income, rural residence, and state (Table 3). Minorities aged ≥65 years old (OR 2.501) (compared with minorities aged 0-19 years) and minorities on Medicare (OR 1.669) (compared with minorities with private health insurance) had the highest odds for a preventable lupus hospitalization. In adjusted analysis for Whites, public health insurance was still synonymous with preventable lupus hospitalizations. Whites with Medicaid, no insurance, and Medicare had more than 38% greater odds of having poor access to health care compared with Whites with private health insurance. For those who were uninsured, Whites (OR 1.388, CI 0.993, 1.940) and minorities (OR 1.306, CI 0.895, 1.905) had higher odds for a preventable lupus hospitalization, but this finding was not significant. Sensitivity analysis showed increased odds of a preventable hospitalization for aging minorities, minorities with public health insurance, female minorities, and Whites with public insurance (Table 4).

Length of Stay (LOS)

In unadjusted analysis, minorities had a significantly longer LOS than Whites (OR 1.132). In both minorities and Whites, Medicare and older age (65+) were associated with a higher odds of longer LOS (Table 5). In Whites, Medicaid was associated with higher odds of longer LOS. However, minority females and Whites from rural areas had lower odds for longer LOS. Similar to our adjusted analysis, sensitivity analysis showed minorities and Whites with public health insurance had increased odds for a long LOS; however, mi-

Table 3. Adjusted model illustrating odds ratio and 95% CIs for preventable lupus hospitalizations by race/ethnicity[a]

	Whites	Minorities
Characteristic		
Health insurance		
Private insurance	Ref	Ref
Medicare	1.451 (1.211, 1.737)[a]	1.669 (1.353, 2.059)[a]
Medicaid	1.480 (1.187, 1.845)[a]	1.662 (1.321, 2.092)[a]
Uninsured	1.388 (.993, 1.940)	1.306 (.895, 1.905)
Sex		
Male	Ref	Ref
Female	1.173 (.948, 1.453)	1.279 (.999, 1.638)
Age groups, years		
0-19	Ref	Ref
20-39	1.475 (.633, 3.438)	1.772 (1.096, 2.863)[a]
40-64	1.893 (.822, 4.359)	2.248 (1.394, 3.627)[a]
≥65	1.499 (.643, 3.497)	2.501 (1.501, 4.169)[a]
Median household income, $		
≥63k, 100th percentile	Ref	Ref
0 - 38,999, 25th percentile	1.103 (.856, 1.422)	1.245 (.855, 1.815)
39k - 47,999, 50th percentile	1.006 (.785, 1.289)	1.278 (.873, 1.871)
48k - 62,999, 75th percentile	.977 (.750, 1.271)	1.210 (.810, 1.808)
Residence		
Urban	Ref	Ref
Rural	.961 (.788, 1.172)	1.220 (.980, 1.518)
State		
Florida	Ref	Ref
North Carolina	.937 (.788, 1.115)	.929 (.777, 1.112)
South Carolina	.987 (.804, 1.211)	1.001 (.807, 1.242)

a. Indicates significant at P<.05

nority females and rural Whites had lower odds for a long LOS (Table 6).

Discussion

The majority of the lupus hospitalizations in our sample were female, on Medicare, and from Florida. Almost 10% of the total sample had a preventable hospitalization, a validated surrogate measure for poor access to primary care. For minorities, being aged >40 years and on public health insurance increased the odds for a preventable hospitalization. For Whites, those with public health insurance had the highest odds of preventable hospitalizations. Minorities with Medicare and Whites with public health insurance also had a higher likelihood of longer hospital LOS. Our sensitivity analysis showed similar results.

Several reasons may explain poor access to primary care for people living with lupus. More obvious reasons may be the well-documented national shortage of specialty care providers, particularly rheumatologists.[24] Patients have also reported barriers to access in the form of physical distance to specialty care, lack of transportation, or inability to take time off from work to see various specialty providers several times a year for a chronic condition such as lupus.[25] The high costs of visits, medications, and other disease-related accommodations can also serve as a deterrent to accessing care for patients with socioeconomic limitations.[26]

Another explanation for poor access to primary care may be on the health care provider. According to the Agency for Health care Research and Quality (AHRQ), there are four components to access to primary care for all patients: 1) gain entry into the system (coverage); 2) have a usual source of care (services); 3) receive needed services in a timely manner (timeliness); and 4) have communication and trust with health care provider (workforce).[27] In regard to timeliness, lupus patients may face barriers to care when access to specialists with expertise in diagnosing and treating lupus have long appointment wait times and limited support staff for insurance authorizations. These delays translate into patients not receiving the appropriate treatment in a timely manner. For instance, one study of community health center physicians found that 94% would not start a patient with lupus on an immunosuppressant,[28] emphasizing the need for improved access to rheumatology services. For lupus patients, immunosuppressants are often needed to control disease activity and are required for severe disease affecting major organs such as the kidneys[29] to help prevent organ damage and minimize the likelihood of a preventable hospitalization. The lack of timely care or access to immunosuppressants can have a detrimental effect on health for people living with lupus. Such deficits are compounded by findings that doctors may not be skilled in determining their needs and the barriers that lupus patients experience, which may preclude adequate disease management and contribute to persistent disparities.[26]

Although our sample combined several racial/ethnic groups to form the minority group, Blacks comprised approximately 37% of the minority group within our sample. With this in mind, we discuss how Blacks with lupus vary from Whites with lupus. Blacks with lupus, on average, have a younger age of disease onset, have a higher disease activity than Whites, and are more likely to have lupus nephritis leading to ESRD.[30] In one study examining ethnic disparities among lupus patients, researchers found, at baseline, Blacks had more disease damage accrual than both Whites and Hispanics.[30] In another study using South Carolina hospitalization data from 1996 to 2003, researchers reported that Blacks had higher comorbidity index scores compared with Whites.[31] These racial differences in lupus clinical manifestations—disease activity, lupus nephritis, disease damage, comorbidity index scores—may contribute to the number of minorities on Medicare, particularly those with kidney involvement.

In our study, minorities aged 40-64 years and minorities with Medicare had a higher likelihood of preventable hospitalizations. This may be due to a combination of factors including 1) how lupus disease presents in Blacks; 2) middle-aged individuals may be caring for both children and aging parents; and 3) those on Medicare in our sample may not necessarily be older but may have ESRD and be sicker or have more chronic conditions, which allows them to claim Medicare benefits. Blacks with lupus face an array of disadvantageous factors that can impact access to primary care and may lead to more preventable hospitalizations.

Table 4. Sensitivity analysis: adjusted model illustrating OR and 95%CI for preventable lupus hospitalizations by race/ethnicity[a]

	Whites	Minorities
Characteristic		
Health insurance		
Private insurance	Ref	Ref
Medicare	1.463 (1.208, 1.771)[a]	1.659 (1.338, 2.058)[a]
Medicaid	1.476 (1.179, 1.848)[a]	1.668 (1.322, 2.106)[a]
Uninsured	1.400 (.999, 1.961)	1.316 (.900, 1.923)
Sex		
Male	Ref	Ref
Female	1.074 (.823, 1.400)	1.424 (1.077, 1.884)[a]
Age groups, years		
0-19 y/o	Ref	Ref
20-39 y/o	1.483 (.636, 3.458)	1.774 (1.097, 2.867)[a]
40-64 y/o	1.893 (.822, 4.364)	2.250 (1.395, 3.631)[a]
Median household income, $		
≥63k, 100th percentile	Ref	Ref
0 - 38,999, 25th percentile	1.123 (.824, 1.532)	1.175 (.780, 1.770)
39k - 47,999, 50th percentile	.992 (.730, 1.348)	1.238 (.818, 1.875)
48k - 62,999, 75th percentile	.884 (.637, 1.227)	1.225 (.792, 1.896)
Residence		
Urban	Ref	Ref
Rural	1.079 (.851, 1.369)	1.235 (.974, 1.564)
State		
Florida	Ref	Ref
North Carolina	.894 (.720, 1.111)	.956 (.788, 1.160)
South Carolina	.965 (.748, 1.244)	1.098 (.870, 1.386)

a. Indicates significant at P<.05.

While Whites may not be considered a traditionally disadvantaged group, individuals who have public health insurance or those with no health insurance are considered traditionally disadvantaged[3] and may experience poor access to primary care, which can lead to health disparities like a greater disease burden. Medicaid patients may have more chronic conditions compared with patients who have private health insurance or no health insurance.[32] In one study, researchers surveyed patients about access to primary care and found self-rated access was lower in areas with greater numbers of uninsured (R^2=.73, P<.001) and Medicaid insurance (R^2=.61, P<.001).[1] Researchers also found preventable hospitalization admissions were higher in zip codes with higher percentages of uninsured and Medicaid patients.[1] Having public insurance or no insurance, coupled with being chronically ill, may result in fatigue with the health care system and medical bills; this may be particularly true for low-income people living with lupus.[33] For example, patients who are working hourly jobs and struggling to make

Table 5. Adjusted odds ratios and CIs for longer length of stay (3+ days) by race/ethnicity[a]

Variables	White	Minorities
Insurance type		
Private health insurance	Ref	Ref
Medicare	1.291 (1.164, 1.432)[a]	1.275 (1.149, 1.415)[a]
Medicaid	1.271 (1.115, 1.449)[a]	1.118 (.998, 1.254)
Uninsured	.949 (.775, 1.162)	.902 (.747, 1.090)
Residence type		
Urban	Ref	Ref
Rural	.826 (.735, .929)[a]	.892 (.785, 1.013)
Age		
0-19 years old	Ref	Ref
20-39 years old	.939 (.629, 1.401)	1.063 (.873, 1.293)
40-64 years old	1.241 (.838, 1.839)	1.187 (.976, 1.445)
≥65 years old	1.582 (1.058, 2.367)[a]	1.269 (1.012, 1.591)[a]
Sex		
Male	Ref	Ref
Female	.964 (.854, 1.088)	.808 (.711, .917)[a]
Median household income		
≥$63k, 100th percentile	Ref	Ref
$0 - $38,999, 25th percentile	1.050 (.904, 1.219)	1.181 (.983, 1.420)
$39k - $47,999, 50th percentile	1.017 (.880, 1.175)	1.064 (.883, 1.282)
$48k - $62,999, 75th percentile	1.030 (.884, 1.201)	1.049 (.861, 1.278)
State		
Florida	Ref	Ref
North Carolina	.980 (.886, 1.085)	.979 (.889, 1.079)
South Carolina	.960 (.849, 1.085)	1.189 (1.050, 1.346)[a]

a. Indicates significant at $P<.05$.

ends meet may not make it a priority to consistently visit their health care provider and pay for costly specialty appointments and medications, especially if they do not have health insurance. This study illustrates that race has an impact on access to primary care; however, insurance status is also a predictor for access to primary care, regardless of race.

In our study, after controlling for rural residence, age, sex, income, and state of residence, both Whites and minorities with Medicare had the highest odds of having a longer LOS. This same finding was also seen in our sensitivity analysis. Patients with lupus who, due to severe kidney involvement, require dialysis may be contributing to the overall longer stay in the hospital. Medicare is generally for those aged ≥65 years; however, as mentioned previously, younger people with ESRD are eligible for Medicare coverage. Whites with Medicaid also had significantly increased odds for longer LOS. As stated earlier, Medicaid recipients are generally sicker and have more chronic illnesses, so this may explain why White patients on Medicaid had higher odds of longer LOS. In short, even though the hospitalizations are considered preventable, sicker patients may need more time in the hospital to address various conditions and complications outside of lupus itself.

Study Limitations

While our sample included a large sample of lupus hospitalizations from three states, some limitations should be considered. Administrative hospital data may have errors, particularly with ICD-9 codes, and data were limited to 2011 and 2012. While there are numerous ACS conditions, our study identified five ACS conditions to measure access. There is limited generalizability as our study only includes three states in the southeastern United States. However, the states included are socio-demographically representative of the national lupus trends described in several large CDC epidemiologic studies.[10] Due to small sample sizes for racial/ethnic minorities, we had to combine all minorities into a generic "minority" group, so we are unable to examine the outcome for each racial/ethnic group separately. Doing so makes it impossible to assess the differences in access to primary care for separate racial or ethnic groups. Lastly, we were unable to assess disease damage or measure frailty, or control for refractory disease activity and flares, which could all impact hospitalizations independent of access to primary care.

CONCLUSIONS

Our findings that middle-aged minorities and those on public health insurance or no health insurance have the highest odds for a preventable hospitalization or poor access to primary care can help health care providers identify people living with lupus who are more likely to experience poor access to primary care.

Table 6. Sensitivity analysis: adjusted ORs and 95%CIs for longer length of stay (3+ days) by race/ethnicity[a]

Variables	White	Minorities
Insurance type		
Private health insurance	Ref	Ref
Medicare	1.289 (1.152, 1.441)[a]	1.278 (1.148, 1.422)[a]
Medicaid	1.263 (1.105, 1.443)[a]	1.125 (1.003, 1.263)[a]
Uninsured	.938 (.765, 1.151)	.911 (0.754, 1.102)
Residence type		
Urban	Ref	Ref
Rural	.785 (0.678, .909)[a]	.924 (.806, 1.059)
Age		
0-19 years old	Ref	Ref
20-39 years old	.940 (.630, 1.403)	1.069 (.878, 1.301)
40-64 years old	1.239 (.836, 1.836)	1.197 (.983, 1.457)
Sex		
Male	Ref	Ref
Female	.985 (.842, 1.151)	.790 (.690, .905)[a]
Median household income		
≥$63k, 100th percentile	Ref	Ref
$0 - $38,999, 25th percentile	1.045 (.869, 1.257)	1.122 (.921, 1.367)
$39k - $47,999, 50th percentile	1.060 (.886, 1.269)	1.008 (.825, 1.232)
$48k - $62,999, 75th percentile	.949 (.786, 1.147)	1.012 (.819, 1.252)
State		
Florida	Ref	Ref
North Carolina	1.020 (.899, 1.158)	.979 (.883, 1.085)
South Carolina	.944 (.809, 1.101)	1.125 (.985, 1.286)

a. Indicates significant at $P<.05$.

This study may also motivate public health insurance programs or health care providers who treat lupus patients to develop programs that ensure follow-up care, particularly with specialists. For example, primary care doctors' offices and health insurance companies can institute regular and consistent phone calls, emails, or letters to lupus patients to either recommend specialists in the local area or ensure lupus patients are visiting necessary specialists in a timely manner. Furthermore, health care providers and health insurance companies can work with experienced lupus patient navigators who can help lupus patients, especially those who are newly diagnosed with the disease, learn disease management strategies, understand clinical test results, and find established community resources (eg, support groups or medical care). Although telehealth visits are an option, it is difficult to recommend since lupus patients require frequent clinical tests (eg, blood and urine) to monitor disease activity and kidney involvement. Future research studies should develop feasible approaches to identify and reduce barriers to care. Lastly, researchers should develop longitudinal, mixed-methods studies with lupus patients that measure access to primary care over time to better identify and intervene at critical junctures where gaps in care are most prominent and have the greatest implications for prognosis.

> *Almost 10% of the total sample had a preventable hospitalization, a validated surrogate measure for poor access to primary care.*

Acknowledgments

This research study was supported in part by the Southern Regional Education Board (SREB) State Doctoral Fellowship. Data and analytic support were provided through the Comparative Effectiveness and Data Analytics Research Resource Core, funded by the Medical University of South Carolina Office of the Provost. Special thanks to Drs. Paul J. Nietert, PhD and Kit N. Simpson, DrPH at the Medical University of South Carolina.

Conflict of Interest

No conflicts of interest to report.

Author Contributions

Research concept and design: Brown, Gebregziabher; Acquisition of data: Brown; Data analysis and interpretation: Brown, Gebregziabher, Kamen, White, Williams; Manuscript draft: Brown, Gebregziabher, Kamen, White, Williams; Statistical expertise: Brown, Gebregziabher; Administrative: Brown, Kamen, White, Williams; Supervision: Brown, Gebregziabher, Williams

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