Ethnic Disparities Among Patients with Systemic Lupus Erythematosus in South Carolina

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ABSTRACT. ***Objective.*** To evaluate whether ethnic disparities in mortality exist among hospitalized patients with systemic lupus erythematosus (SLE) in South Carolina, USA.

Methods. Administrative data were obtained on all SLE patients (ICD-9 code 710.0) hospitalized in South Carolina between 1996 and 2003. An SLE-specific comorbidity index validated as a predictor of hospital mortality was used as a measure of overall comorbidity. Cox proportional hazards models were used to compare mortality rates between Caucasians and African Americans. Post-hoc analyses focused on determining whether disparities were present across different risk strata.

Results. Of 6521 hospitalized patients with SLE (5728 female, 793 male), 1280 (19.6%) died. Annual mortality rates were 21.9% among Caucasians and 25.0% among African Americans. The comorbidity index score was significantly higher among African Americans [median 2.0 (interquartile range 0.0–4.0)] versus Caucasians [median 0.0 (IQR 0.0–3.0); $p < 0.0001$, Wilcoxon rank-sum test]; however, even after multivariate adjustment, African Americans had a 15% increased mortality risk (hazard ratio 1.15, 95% CI 1.02–1.29, $p = 0.013$). The disparity was strongest among those with less comorbidity (HR 1.39, 95% CI 1.05–1.81, $p = 0.017$). Among patients with low comorbidity index scores ($n = 3485$), the annual mortality rate was 8.1% among Caucasians and 9.7% among African Americans. No ethnic differences in mortality were seen for patients with higher comorbidity.

Conclusion. In South Carolina, ethnic disparities in SLE mortality exist, predominantly among those with the least illness severity. Studies are planned to help clarify whether access and quality of care play a role. (First Release Mar 15 2008; J Rheumatol 2008;35:819–25)

Key Indexing Terms:

SYSTEMIC LUPUS ERYTHEMATOSUS MORTALITY
RACE ETHNICITY DISPARITY

Survival among patients with systemic lupus erythematosus (SLE) has progressively improved over recent decades[1-6]. Multiple factors are likely responsible for this improved prognosis, including earlier detection, advances in therapies, and more cautious monitoring for toxicity. However, this trend has not been consistent among all ethnic groups[3,6]. Death due to SLE among African American women between the ages of 45 and 64 years increased by nearly 70% in the period 1979-98 in the United States[3].

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SLE is a disease with striking ethnic disparities. African Americans experience an increased incidence and increased morbidity and mortality related to SLE compared to Caucasians[1-11]. Many factors likely contribute to this disparity including genetic differences, environmental exposures, and socioeconomic factors. Unequal access to medical care and quality of care are also thought to play important roles in patient outcome. It has been shown that patients with SLE cared for at hospitals with more experience in treating SLE have lower in-hospital mortality[12].

Mortality studies are often difficult to compare since they are composed of differing ethnic populations at various stages of disease. The population of South Carolina is roughly 30% African American with very few other minority groups[13]. We assessed whether ethnic disparities in mortality exist among hospitalized patients with SLE in South Carolina and also evaluated causes of death among patients with SLE.

MATERIALS AND METHODS

Study design. This was a retrospective analysis of administrative hospitalization data in South Carolina. The South Carolina Office of Research and Statistics (ORS) routinely collects data on every hospital admission and emergency room visit in the state, excluding federal and military hospitals.

All facilities are required to submit detailed data to ORS, including demographic information, dates and type of hospital admission and discharge, diagnostic and procedure codes, insurance status, and providers involved in patient care during the admission. ORS routinely generates edit reports on data submissions by each facility to ensure the highest possible level of completeness and accuracy. Hospitalization data are available to investigators for research purposes after approval from ORS. Personal identifiers are used to link multiple encounters across a number of statewide administrative databases for the same individual, and a unique identification number is assigned to each person. Vital statistic records were obtained from the South Carolina Department of Health and Environmental Control (DHEC) for SLE patients who died during the study period and were linked to the hospitalization data by ORS using the unique patient identification numbers. All personal identifiers and protected health information were removed by ORS prior to release of the data to study investigators. The purpose of the study was to assess ethnic disparities in mortality among SLE patients in South Carolina by using inpatient hospitalization data linked with death certificate information.

Patient selection. After the study was approved by the Medical University of South Carolina Institutional Review Board and the ORS data oversight committee, all patients with a diagnosis of SLE [International Classification of Diseases, Ninth Revision (ICD-9) code 710.0] in South Carolina between 1996 and 2003 were identified by ORS. This timeframe was chosen based on availability of data. ORS then re-searched their databases for all hospital encounters by those patients. This approach was taken in order to identify hospital utilization among SLE patients for all causes, not just lupus-related events. For a given patient, the hospital encounter became the unit observation. However, for patients with multiple hospital encounters during the study period, the most recent hospital encounter was selected for inclusion in our analysis. Patients residing outside South Carolina were excluded, as vital statistics (i.e., followup mortality data) were not available from other states.

Data collection/study variables. Demographic and socioeconomic data were obtained including age (5-year age groupings), sex, ethnicity, insurance type [private, public (including Medicaid, Medicare, etc.), and other (no insurance, self-pay, etc.)], and zip code-specific income and level of education. Ethnicity was recorded at each individual facility at the time of admission by self-report and was documented in over 99.8% of all hospital admissions in our dataset. Hospitalization characteristics included diagnosis-related group (DRG) codes, up to 10 ICD-9 diagnosis codes, medical versus surgical admission, length of stay, type of admission (transfer vs non-transfer, emergent vs elective), and teaching status of the hospital.

Income and education data were obtained from zip code-specific estimates from the 2000 US Census Bureau records. For each hospitalization that occurred in the database, ORS linked the median household income and percentage of residents over age 25 years with at least a high school education via the patient's zip code of residence.

Comorbid conditions coded during the hospital encounter were incorporated into an SLE-specific comorbidity index that was used as a measure of overall comorbidity. This index is a modification of the generic Charlson index and was developed as a measure of risk of in-hospital mortality. It is a weighted sum of common chronic medical conditions used to adjust for differences in illness severity among medical patients. The SLE-specific comorbidity index used in this study is a weighted sum of 14 comorbidities based on ICD-9 codes, which has been validated[14]. This index does not measure lupus severity; rather, it is an assessment of overall illness severity among hospitalized patients with SLE based on comorbidities. The comorbidities incorporated into the SLE-specific comorbidity index include heart failure, cerebrovascular disease, diabetes mellitus, myocardial infarction, peripheral vascular disease, pericarditis, pleuritis, nephritis, renal failure, AIDS, metastatic cancer, any malignancy, thrombocytopenia, and severe liver disease.

Statistical analysis. Comparisons of demographic and clinical characteristics between Caucasians and African American patients with SLE were performed using t-tests, chi-square tests, and Wilcoxon rank-sum tests, as appropriate. Patient and hospitalization characteristics were then used in a Cox proportional hazards model to compare study period survival rates between Caucasians and African Americans with SLE. The model results were expressed as hazard ratios (HR) and their 95% confidence intervals (95% CI). The HR variance estimates were obtained using 1000 bootstrap replications with bias correction. Bootstrapping is a technique used to estimate parameter variation by repeatedly sampling with replacement from the original study sample and calculating the parameter variation across these various samples[15], and the results are considered robust and not unduly swayed by outliers. The analysis was limited to African Americans and Caucasians since the number of patients representing other ethnic groups was very low. Post-hoc analyses focused on whether ethnic disparities were present across 4 different SLE-specific comorbidity index categories (category 1: index score = 0; category 2: index score = 1 to 2; category 3: index score = 3 to 5; category 4: index score > 5). These categories were chosen to ensure comparable numbers of study subjects in each category. All bivariate analyses were performed with SAS 9.1 (SAS, Cary, NC, USA), while all Cox proportional hazards models were performed with Stata 9.1 (Stata, College Station, TX, USA). For all variables included in the Cox models, the proportional hazards assumption was verified. For all statistical comparisons, p values < 0.05 were considered statistically significant. No statistical adjustment was made for the testing of multiple hypotheses.

RESULTS

There were 6521 unique patients with SLE (3288 Caucasian women, 2440 African American women, 454 Caucasian men, 339 African American men) hospitalized in South Carolina from 1996 to 2003. Among these patients, 1280 (19.6%) deaths occurred during the followup period. There were 102 hospitalized SLE patients from other ethnic minorities who were excluded from the analysis.

The demographic and clinical characteristics are summarized in Tables 1 and 2, respectively. African American patients with SLE were significantly ($p < 0.0001$) more likely to be hospitalized at younger ages than Caucasian patients. Level of education and annual household income was significantly ($p < 0.0001$) lower among African Americans compared to Caucasians, and Caucasians were also significantly ($p < 0.0001$) more likely to have private insurance.

A total of 1280 (19.6%) patients died during the study period, of whom 744 (58.1%) died in the hospital. The crude (unadjusted) in-hospital death rate for hospitalized patients with SLE was significantly ($p < 0.001$) higher among African Americans (12.9%) than among Caucasians (10.3%). The 1-year mortality rate, defined as the percentage of patients who died within 1 year of the date of discharge, was calculated, excluding patients discharged in the last year of the study (2003). The crude 1-year mortality rate was also significantly ($p < 0.05$) higher among African Americans (25.3%) compared to Caucasians (22.5%).

There were a number of other striking significant differences between Caucasian and African American hospitalized SLE patients. Compared to Caucasians, African American patients experienced longer lengths of hospital stays, were more likely to have had a medical (rather than surgical) admission, were more likely to have been admitted

Table 1. Demographic characteristics by race.

Characteristic	Caucasian, n = 3742	African American, n = 2779	Total, n = 6521
Female, %	87.9	87.8	87.8
Age, yrs, %*			
0–34	14.2	24.6	18.6
35–49	25.8	38.1	31.0
50–64	29.4	24.6	27.4
65+	30.6	12.7	23.0
Education, %†*	56.5	55.1	55.9
Annual household income††, median (interquartile range)	36,394 (31,819 to 42,966)	32,030 (27,356 to 37,436)	34,860 (29,913 to 40,590)
Insurance*, %			
Private	40.0	31.9	36.5
Public	55.0	61.0	58.0
Other	5.0	7.1	5.5

* $p < 0.0001$ comparing Caucasians to African Americans by t-tests, chi-square tests, or Wilcoxon rank-sum tests, as appropriate. † Patients' level of education defined by percentage with at least high school education among adults over age 25 years in their zip code of residence (2000 US Census). †† Patients' household income defined by median household income in their zip code of residence (2000 US Census).

Table 2. Clinical characteristics by race.

Characteristic	Caucasian, n = 3742	African American, n = 2779	Total, n = 6521
In-hospital death, %**	10.3	12.9	11.4
1-year mortality, %*	22.5	25.3	23.7
Length of stay, median days*** (interquartile range)	3.0 (2.0 to 6.0)	4.0 (2.0 to 7.0)	4.0 (2.0 to 7.0)
Diagnosis-related group classification***			
Medical, %	66.8	71.9	69.0
Surgical, %	33.2	28.1	31.0
Teaching hospital, %***	40.3	46.8	43.1
Admission classified as emergent, %***	43.5	52.4	47.3
Transferred from another hospital, %	4.3	5.2	4.7
Comorbidity index score, mean (SD)***	1.85 (2.83)	2.18 (2.70)	1.99 (2.78)
Heart failure, %	11.0	9.6	
Cerebrovascular disease, %	5.9	6.3	
Diabetes mellitus, %**	10.7	13.4	
Myocardial infarction, %***	6.6	4.0	
Perivascular disease, %	3.3	2.6	
Renal failure, %***	4.5	14.2	
AIDS, %*	0	0.3	
Metastatic cancer, %	2.0	1.5	
Any malignancy, %**	4.8	3.0	
Severe liver disease, %	2.2	1.8	
Pericarditis, %***	0.6	1.9	
Pleuritis, %	2.7	3.4	
Nephritis, %***	6.2	15.5	
Thrombocytopenia, %***	4.0	6.1	

*$p < 0.05$, ** $p < 0.001$, *** $p < 0.0001$, comparing Caucasians to African Americans by t-tests, chi-square tests, or Wilcoxon rank-sum tests, as appropriate.

to a teaching hospital, and were more likely to have had their admission classified as emergent ($p < 0.0001$). The average comorbidity index score was also significantly higher among African Americans compared to Caucasians (mean ± SD 2.18 ± 2.70 vs 1.85 ± 2.83).

Of the hospitalized SLE patients who died during the study period, 715 (55.9%) were Caucasian and 565 (44.1%) were African American. As shown in Table 3, African Americans died at significantly ($p < 0.0001$) younger ages than Caucasians. For example, of the Caucasian patients

Table 3. Age at death by race.

Age, yrs	Caucasian, n = 715 (%)	African American, n = 565 (%)	Total, n = 1280 (%)
< 34	25 (3.5)	99 (17.5)	124 (9.7)
35–49	72 (10.0)	179 (25.0)	251 (19.6)
50–64	175 (24.5)	152 (26.9)	327 (25.5)
> 65	443 (62.0)	135 (23.9)	578 (45.2)
Total	715 (100.0)	565 (100.0)	1280 (100.0)

who died, 13.5% were younger than 50 years old, compared to 43.5% of the African American patients who died. Similarly, a large majority (62%) of Caucasians who died were above age 65, compared to only 23.9% of African Americans who died above age 65.

Results of the multivariable Cox proportional hazards model are shown in Table 4. Compared with Caucasians, African American patients had a significantly increased mortality hazard, even after adjusting for all other variables including indicators of illness severity during the study period (HR 1.15, 95% CI 1.03–1.29, p = 0.013). Other characteristics associated with increased mortality included older age, public insurance, lower household income, less education, emergent admission, being transferred from another hospital, longer length of hospital stay, and higher SLE comorbidity index scores. Compared to other patients, patients with public insurance experienced a 56% increased mortality hazard (p = 0.011). Patients with higher median annual household income experienced a significant decreased risk of death (p < 0.001); similarly, those with more education had a decreased chance of dying during the study period (p = 0.027). The mortality hazard was increased by 44% among patients whose admission was classified as emergent compared to other patients (p < 0.0001), and the hazard was increased by 33% among patients who were transferred from another hospital (p = 0.007). For each additional day in the hospital, the mortality hazard increased by 6% (p < 0.0001), and each additional 1-point increase in a patient's comorbidity index score corresponded to a 13% increased mortality hazard throughout the followup period (p < 0.0001). There was no significant mortality hazard difference by gender or by teaching status of the hospital.

Table 4. Results from Cox proportional hazards model. Hazard ratios (HR) were based on a Cox proportional hazards model that adjusted for all the listed patient and hospitalization characteristics.

Characteristic	Adjusted HR	95% CI	p
Race			
Caucasian	1.00	—	—
African American	1.15	1.03–1.29	0.013
Age	1.12*	1.10–1.14	< 0.0001
Sex			
Female	1.00	—	—
Male	1.13	0.98–1.31	0.0914
Insurance			
Public	1.56	1.14–2.29	0.011
Private	1.01	0.72–1.43	0.947
Other	1.00	—	—
Income	0.88	0.83–0.94	< 0.001
Education	0.39	0.17–0.90	0.027
Admission classified as emergent			
No	1.00	—	—
Yes	1.44	1.28–1.62	< 0.0001
Transferred from another hospital			
No	1.00	—	—
Yes	1.33	1.08–1.64	0.007
Length of stay	1.06	1.01–1.02	< 0.0001
Teaching hospital			
No	1.00	—	—
Yes	1.03	0.92–1.16	0.610
Comorbidity index	1.13	1.11–1.15	< 0.0001

* Hazard ratio for age represents the increased hazard of dying at any given point in time associated with a 5-year increase in age.

As stated, there were some interesting associations among race, SLE comorbidity index score, and mortality rates. The comorbidity index score was higher among African American patients (2.18) compared to Caucasian patients (1.85; Table 2), and each 1-point increase in a patient's comorbidity index score resulted in a 13% increased mortality hazard (Table 4). Additionally, the overall mortality hazard was increased by 15% among African Americans compared to Caucasians (Table 4). These results led to post-hoc analyses to consider whether the increased hazard among African Americans was consistent across all comorbidity risk strata. Table 5 lists the 4 comorbidity risk strata and accompanying mortality data by race. The unadjusted 1-year crude mortality rates were higher among African Americans in the lowest (African Americans 9.7% vs Caucasians 8.3%) and highest (African Americans 59.2% vs Caucasians 56.3%) comorbidity risk strata, but not in either of the middle comorbidity risk strata. After multivariable adjustment using the full study period followup mortality data, the Cox proportional hazards models demonstrated that only in the lowest comorbidity risk stratum was the mortality hazard significantly increased among African Americans compared to Caucasians (HR 1.39, 95% CI 1.05–1.81, p = 0.017).

Further post-hoc analyses led us to consider causes of death among SLE patients who died, and whether the causes of death differed significantly by race. The leading causes of death, as reported on death certificates, are listed in Table 6. Of all the hospitalized African American patients with SLE who died, 20.4% had SLE listed as the leading cause of death compared to 9.4% of Caucasians who died (p < 0.0001). When SLE was listed as the leading cause, SLE was replaced by the first contributing cause of death from the death certificate. Overall, cardiovascular disease was the leading cause of death, with ischemic heart disease representing 170 (36%) of all deaths. Malignancy was the

Table 5. Associations between SLE mortality risk index, race, and mortality.

Comorbidity Index	N	1-year Crude Mortality Rate (Caucasian), %	1-year Crude Mortality Rate (African American), %	Multi-year Hazard Ratio* (95% CI) Comparing African Americans to Caucasians
0	3489	8.3	9.7	1.39† (1.05 to 1.81)
2	1380	32.1	27.9	0.95 (0.75 to 1.21)
3–5	940	42.5	42.4	1.11 (0.87 to 1.37)
> 5	812	56.3	59.2	0.98 (0.78 to 1.20)

* Adjusted for age, sex, income, education, and hospitalization characteristics in stratified (by comorbidity index score category) multivariable Cox proportional hazards models. † p = 0.017.

Table 6. Causes of death among 1280 hospitalized patients with SLE in South Carolina 1996–2003.

Cause of Death	N (%)
Cardiovascular disease	464 (36.3)
Ischemic heart disease	170
Cerebrovascular disease	77
Hypertension	44
Congestive heart failure	34
Nonischemic cardiomyopathy	24
Pulmonary heart disease	20
Arterial disease	19
Valvular heart disease	11
Other cardiac causes	65
Malignancy	171 (13.4)
Infection	129 (10.1)
Respiratory disease	92 (7.2)
Digestive disease	79 (6.2)
Endocrine/metabolic disease	73 (5.7)
Musculoskeletal disease (non-SLE causes)	70 (5.5)
Genitourinary disease	53 (4.1)
External causes of mortality	33 (2.6)
Nervous system disease	27 (2.1)
Hematologic (nonmalignant) disease	27 (2.1)
Skin/subcutaneous disease	25 (1.9)
Mental/behavioral disease	19 (1.5)
Injury/poisoning	10 (0.8)
Abnormal clinical/laboratory finding	5 (0.3)
Congenital malformations	3 (0.2)
Total	1280

second leading cause of death (13.4%), followed by infection (10.1%). Death due to cardiovascular disease was the leading cause of death across all age groups and increased with age among both race groups. While cause of death was similar among both race groups in patients aged 50 years and older, there were significant differences by race among those less than 50 years old. Among patients less than 50 years old, African American patients were less likely to die of malignancy than Caucasians (7.3% of deaths vs 16.5%; p = 0.007) and more likely to die of infection (15.3% of deaths vs 6.2%; p = 0.024).

DISCUSSION

This study of ethnic disparities in mortality among hospitalized patients with SLE in South Carolina found that African Americans with SLE experienced a greater chance of in-hospital and 1-year mortality following hospital discharge compared to Caucasians. African Americans were hospitalized and also died at significantly younger ages than their Caucasian counterparts, and the disparity was most pronounced among those with less overall comorbidity. African Americans earned lower incomes, had less education, and were more likely to have public insurance than Caucasian SLE patients, emphasizing the important and complex role of socioeconomic factors in SLE mortality.

The SLE-specific comorbidity index used in this study was significantly higher among African Americans, showing that they had increased overall comorbidity, suggesting increased illness severity. Thus, it is not surprising that African Americans were also more likely to have emergent admissions with longer hospitalization stays. However, after adjusting for all other variables, African Americans had an increased risk of mortality, but this risk was not uniform across the entire group. African Americans with the least severe illness (comorbidity index score of zero) were significantly more likely to die than Caucasians with the same level of comorbidity. Among those with more severe illness (comorbidity index scores > 2), there was no significant difference, suggesting that African American and Caucasian patients with higher levels of comorbidity have equal access to care, receive similar treatment, and subsequently have similar clinical outcomes.

Ethnic disparities in SLE mortality have been documented in the literature for decades[4,7-11] and exist in other rheumatic diseases as well, such as systemic sclerosis[16,17]. Nietert, *et al* showed that among patients with systemic sclerosis hospitalized in South Carolina, in-hospital deaths among African Americans (23.0%) were higher than those among Caucasians (15.6%), a finding that remained after adjustment for other sociodemographic and clinical factors

(odds ratio 1.70, 95% CI 1.01–2.86)[17]. In SLE, African American women are particularly vulnerable to poorer outcomes. Similar to data from the Centers for Disease Control[3], Walsh, *et al* showed diverging ethnic trends, with African American SLE patients experiencing increased mortality related to SLE compared to Caucasian SLE patients in the US[9].

Caution must be taken when comparing mortality studies due to cohort differences because of varied ethnic backgrounds and duration of disease, but also due to differing study methods, timeframe, and years of followup. Thus, while direct comparisons are difficult, it appears that mortality among SLE patients in South Carolina is higher than that seen in other recently published large cohorts of SLE patients. For example, Krishnan reported on national mortality outcomes among hospitalized SLE patients regardless of cause of admission using methods similar to ours, and found a low mortality rate of 3.1% (2454 deaths out of 76,961 hospitalized SLE patients) in the US 1998-2002, a timeframe similar to that of our study although the followup period was 2 years shorter[11]. A national hospital database was used in this study and no information was provided on the racial background of subjects.

Bernatsky, *et al* observed 1255 deaths among a total of 9547 (13.1%) patients with an average followup period of 8.1 years[5]. This was an international cohort representing 23 centers across 7 countries. The authors reported that standardized mortality ratio (SMR) estimates consistently increased for SLE patients compared to the general population, but some countries (Canada and England) had much higher SMR estimates compared to others (Sweden and South Korea), an important reminder that genetic, demographic, and socioeconomic factors play an important role in SLE mortality.

While survival for patients with SLE has improved over time, a shift in the causes of death among SLE patients has been widely reported[1-6]. Our results are consistent with other reports showing cardiovascular disease as the leading cause of death among all age groups. Malignancy and infections were the second and third leading causes of death, respectively. The major difference in cause of death in our study was seen among the younger patients. African Americans less than 50 years old were more likely to die of infection compared to Caucasians. African American SLE patients had a higher frequency of lupus-specific comorbidities (Table 2), particularly nephritis, that likely translates to more aggressive therapy. Death related to infection among the younger African American SLE patients may represent a complication of immunosuppressive therapy, inadequate monitoring, and/or limited access to care while undergoing immunosuppressant therapy. However, it is also possible that this finding is explained by complications related to non-SLE comorbidities, such as diabetes mellitus.

Our study has multiple strengths including a large hospital population-based sample and the ability to link to multiple data sources, including vital statistics and US Census Bureau records. The study population was not restricted to a tertiary academic center, which often implies a more severely ill patient population; rather it is representative of patients with SLE hospitalized across the entire state of South Carolina. While clinical data are limited in administrative databases, we were able to adjust for illness severity by using a validated comorbidity index specific for SLE. While this index does not measure lupus severity, it does predict in-hospital mortality[14] and allowed us to develop categories of mortality risk for comparison based on level of comorbidity.

There are limitations of using hospitalization administrative data for research purposes. As with all studies using administrative databases, our data rely heavily on ICD-9 coding practices. Some variables not directly associated with billing are likely underreported. ORS documents the 3 leading provider specialty codes for any given admission, so complete data on all specialists involved in a patient's care, specifically involvement of a rheumatologist, were missing from our dataset. In addition, coding errors at individual facilities may result in the inclusion of patients who do not have SLE if they were previously misclassified on a prior hospital encounter. For example, a nonrheumatology provider may assign ICD-9 code 710.0 to a patient with a positive antinuclear antibody and arthralgias, which would dilute the population of patients with SLE. SLE is a disease with high rates of referral to specialists. A survey of 195 primary care providers in North and South Carolina showed that 93% routinely refer their SLE patients to a rheumatologist all or almost all of the time, and only 7% reported that they did not refer SLE patients unless they were severely ill[18] (Cooper GS, unpublished observation). Similarly, Felson, *et al* showed that 72% of general practice physicians were likely to refer SLE patients to a rheumatologist with mild disease, whereas 92% were likely to refer when other complications arose related to SLE[19]. Although the majority of SLE patients in our region are followed by a rheumatologist, misclassification during hospital admission likely still exists, and we are not able to validate statewide coding practices. Nevertheless, we do not believe that misclassification would influence our study results since it would be unlikely for such mistakes to occur more frequently among one ethnic group than another. Additionally, other facility-specific factors, including experience in treating SLE patients, were also not evaluable, given ORS-mandated data restrictions to ensure facilities' anonymity.

Our results suggest that African Americans with SLE experience increased mortality at younger ages that is most pronounced among those with the least severe illness. Mortality following hospitalization is a reflection of individual clinical characteristics and the effectiveness of a healthcare system including access and quality of care. Our data suggest that SLE patients with high comorbidity

receive the same level of care and have a similar clinical response regardless of ethnicity. The disparity in younger women with less comorbidity and increased mortality due to infection and cardiovascular disease suggests that followup care is not equal to that of their Caucasian counterparts. This may reflect access to healthcare, noncompliance, or possibly a lack of focus on treating the associated comorbidities in SLE, notably cardiovascular disease. Current genetic and environmental studies may provide insight into these disparities, but will likely not provide all the answers. Future studies that focus on ensuring equal access to and quality of specialty care are needed to help clarify the cause of this disparity among patients with SLE.

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