ORIGINAL CONTRIBUTION

Racial Disparities in the Surgical Management of Intractable Temporal Lobe Epilepsy in the United States

A Population-Based Analysis

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Objective: To determine whether, over a long time span, race and/or other predictive factors for patients with intractable temporal lobe epilepsy (TLE) who receive anterior temporal lobectomy (ATL) exist on a national level.

Design: Retrospective cohort study.

Patients: Adult patients with TLE admitted for ATL (*International Classification of Diseases, Ninth Revision, Clinical Modification,* 345.41, 345.51; primary procedure code, 01.53).

Interventions: A population-based analysis was performed using the Nationwide Inpatient Sample from 1988 through 2003. Variables besides race that were examined included patient age, sex, and insurance status.

Results: Of the 5779 adults admitted with TLE from 1988 through 2003, 562 (9.7%) received ATL. Multivariate analyses revealed that African American race (odds ratio [OR], 0.56; 95% confidence interval [CI], 0.38-0.84; $P = .005$) and increased age (OR, 0.98; 95% CI, 0.97-0.99; $P < .001$ per 1-year increase in age) independently predicted decreased likelihood of receiving ATL for TLE, while private insurance increased the odds of ATL receipt (OR, 1.85; 95% CI, 1.39-2.46; $P < .001$). These findings remained stable over time.

Conclusions: Fewer than 10% of the TLE patient population receives ATL. Younger age and private insurance are independent predictors of receiving ATL, and African American race independently predicts decreased likelihood of receiving ATL. Despite recent attempts to bridge racial health disparities, the gap between African American and other races in optimal TLE management has remained relatively unchanged on a nationwide level.

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EPILEPSY, DEFINED AS 2 OR more unprovoked seizures, affects 1 in every 118 Americans.[1] Accounting for a burden of illness similar to that of breast cancer in women and lung cancer in men, epilepsy is the second most common cause of mental health disability in the United States.[2,3] The persistence of seizures despite at least 2 adequate trials of antiepileptic drugs, known as intractable epilepsy, has an annual incidence of approximately 3 per 50 000 patients and accounts for more than 75% of the cost of epilepsy care in the United States.[4,5] Epilepsy localized to the temporal lobe is one of the most common intractable epilepsy syndromes.[6]

Patients with intractable temporal lobe epilepsy (TLE) often benefit from surgical management via temporal lobectomy, which can control seizures and reduce mortality.[7,8] Multiple studies have demonstrated that 60% to 80% of appropriately selected patients become seizure free following surgery.[9-13] Moreover, the results of a recent randomized clinical trial have shown that surgical intervention is far superior to continued medical treatment in this patient population.[14]

The differences between the African American populations and those of other races regarding the use of different treatments for the same medical diagnosis have been well documented for ischemic heart disease, but only scarcely for epilepsy and other neurologic disorders.[15-21] Previous reports have also shown that the prevalence of epilepsy among African Americans in the United States is similar to the expected racial distribution for a given area.[20,21] However, a previous study involving a single-center patient population indicated that a smaller proportion of African American patients have epilepsy surgery than their counterparts of other races.[20] To test this observation on a broader scale, we used a nationwide inpatient database to investigate the proportion of African American patients who had surgery for intractable TLE.

Table 1. Clinical Characteristics of 5779 Adult Patients With an *ICD-9-CM* Diagnosis of 345.41 or 345.51 From 1988 Through 2003

Characteristic	Patients, %
Age, mean (SD), y	38.1 (13.7)
Median (range)	36.0 (18-100)
Female sex	53.9
Race	
African American	8.8
Other	91.2
Primary payer	
Private insurance	48.1
All others	51.9
Caseload of hospital	
Large bed size	70.0
Small or medium bed size	30.0
Region of hospital	
Northeast	29.4
North central	19.0
South	27.2
West	24.2
Admission type	
Routine, birth, and others	82.1
Emergency/other/facility/court/law	17.9
Surgeon volume[a]	
Low	18.6
High	81.4
Median income[b]	
1	17.5
2	22.6
3	21.2
4	38.7

Abbreviation: *ICD-9-CM, International Classification of Diseases, Ninth Revision, Clinical Modification.*

[a] Surgeon volume is defined as low if the operating surgeon performed only 1 anterior temporal lobectomy per year; high, more than 1 per year.

[b] For income brackets, see Table 2.

Table 2. Median Income Ranges Across Years In the Nationwide Inpatient Sample Database

Median Income Group	Dollars		
	1988-1997	1998-2002	2003
1	0-25 000	0-24 999	0-35 999
2	25 001-30 000	25 000-34 999	36 000-44 999
3	30 001-35 000	35 000-44 999	45 000-59 999
4	>35 001	>45 000	>60 000

In this analysis, we describe trends in US practice patterns for surgical management of intractable TLE over a 16-year period. The proportion of African American patients and those of other races with intractable TLE who received surgery in the United States from 1988 through 2003 were compared for insurance status, income, geographic distribution, surgeon caseload, and hospital caseload. Additionally, because the increasing awareness of racial disparities in health care prompted the federal government to develop initiatives to address this problem, first in 1993 and later in 1996, we examined our patient population for changes over time to account for these initiatives.[22-24]

METHODS

DATA SOURCE

The data source for this study was the Nationwide Inpatient Sample (NIS) hospital discharge database (http://www.hcup-us.ahrq.gov/nisoverview.jsp), which covered the years 1988 through 2003 and was obtained from Healthcare Cost and Utilization Project, Agency for Healthcare Research and Quality (Rockville, Maryland).[25] The NIS represents approximately 20% of all inpatient admissions to nonfederal hospitals in the United States. For these years, the NIS contains data on 100% of discharges from a stratified random sample of nonfederal hospitals in 8 to 35 states (number of states increased year to year from 1988 to 2003), approximating a 20% representative subsample of all US nonfederal hospital discharges. Because the NIS contains data on all patients discharged from sampled hospitals during the year (regardless of the patient's age or payer), it can be used to obtain the annual total volume of specified procedures at individual hospitals. Additionally, the surgeon who performed the principle procedure following admission is identified by a unique masked code.

INCLUSION AND EXCLUSION CRITERIA

Using a combination of patient age and the *International Classification of Diseases, Ninth Revision, Clinical Modification* diagnosis and treatment codes, a search of the NIS database to identify an admission for temporal lobectomy for intractable TLE was undertaken. Admitted patients aged 18 years or older with a diagnosis code of 345.41 (intractable partial epilepsy with impairment of consciousness) or 345.51 (intractable partial epilepsy with mention of impairment of consciousness) and a primary procedure code of 01.53 (brain lobectomy) were included. Patients with TLE who received surgery (code, 01.53) were compared with those who met diagnoses codes 345.41 and/or 345.51 who did not receive surgery.

PATIENT CHARACTERISTICS

Race, age, sex, median household income for postal (zip) code of residence, primary payer (Medicare, Medicaid, private insurance, self pay, no charge, or other), type of admission (emergency, urgent, or elective), and admission source (emergency department, transfer from another hospital, transfer from long-term care, or routine) were coded in the NIS data. Only patients with known race were included in the analysis, which was focused on comparisons between African American patients and those of other races. For the purposes of this study, the entire population that was not African American was referred to as Caucasian, consistent with the methodology of previous studies.[26,27]

PROVIDER AND HOSPITAL CHARACTERISTICS

The number of available beds (small, medium, large), teaching status, hospital region (Northeast, Midwest, South, West), and location (rural, urban) were coded in the NIS data. Surgeon volumes of anterior temporal lobectomy (ATL) for intractable TLE were derived by counting the cases for each identified surgeon per year in the database. Surgeon volume was analyzed as either low caseload (1 ATL per year) or high caseload (more than 1 ATL per year).

Table 3. Clinical Characteristics of 5779 Adult Patients With TLE by Race and Receipt of ATL[a]

Characteristic	Patients, %			
	African American (n=511)	Other Race (n=5268)	Received Procedure (n=562)	Did Not Receive Procedure (n=5217)
Age, mean (SD), y	40.9 (16.1)	37.8 (13.5)	34.4 (9.5)	38.5 (14.1)
Median (range)	39 (18-92)	36 (18-100)	34 (18-65)	36 (18-100)
Female sex	61.1	53.2	53.7	53.9
Primary payer				
Private insurance	30.9	49.8	63.1	46.5
All others	69.1	50.2	36.9	53.5
Admission type				
Routine, birth, and others	68.5	83.4	93.6	80.9
Emergency/other/facility/court/law	31.5	16.6	6.4	19.1
Case load of hospital				
Large bed size	77.3	69.3	70.6	70.0
Small or medium bed size	22.7	30.7	29.4	30.0
Surgeon volume				
Low	0	19.6	18.6	NA
High	100	80.4	81.4	NA
Median income[b]				
1	35.1	15.9	14.4	17.9
2	23.6	22.5	26.6	22.1
3	17.4	21.5	21.8	21.1
4	23.9	40.1	37.2	38.9
Region of hospital				
Northeast	31.1	29.2	19.9	30.4
North central	11.7	19.7	21.9	18.7
South	41.3	25.8	30.6	26.8
West	15.7	25.3	27.6	24.1
African American			4.8	9.3
Received procedure	5.3	10.2		

Abbreviations: ATL, anterior temporal lobectomy; NA, not applicable; TLE, temporal lobe epilepsy.

[a] Age was significant (P=.001). Rao-Scott modified χ^2 P value comparing primary payer, admission type, median income, and received procedure × race was significant (P<.001); female × race was significant (P=.005); and hospital bed size × race was significant (P=.02). Univariate comparisons of characteristic by whether a patient received anterior temporal lobectomy can be seen in Table 5.

[b] For income brackets, see Table 2.

STATISTICAL ANALYSIS

The characteristics of patients, providers, and hospitals were summarized by descriptive statistics. Results were expressed as mean (standard deviation, median, and range) for continuous variables and frequency (percentage) for categorical variables. Rao-Scott–modified χ^2 tests for the univariate comparisons were performed on the categorical variables using PROC SURVEYFREQ from SAS version 9.1 (SAS Institute, Cary, North Carolina). To examine the association between the outcome of whether the patients received surgery and the characteristics of patient age, sex, race, payer, admission type, income, and caseload of hospital, we first fitted a separate logistic regression model for each characteristic against the outcome and reported the odds ratio (OR) with 95% confidence interval (CI) of receiving surgery for each characteristic. We then fitted a multiple logistic regression model on the outcome with the aforementioned characteristics as covariates and reported the adjusted ORs with 95% CIs of receiving surgery for each characteristic in the multivariate analysis. We further fitted 3 separate multiple logistic regression models for the data in 3 separate time periods (1988-1992, 1993-1996, 1997-2003) to examine the time trend. Extrapolations to the entire US population were adjusted for the NIS-stratified survey method by using PROC SURVEYFREQ, PROC SURVEYREG, and PROC SURVEYLOGISTIC in the SAS statistical software program. All probability values shown are 2-tailed. $P < .05$ was accepted as significant.

RESULTS

PATIENT CHARACTERISTICS

The NIS database contained 5779 admissions for adult patients of known race with the diagnosis of intractable TLE from 1988 through 2003 (**Table 1** and **Table 2**). Of these patients, 562 (9.7%) had ATL. The mean age of these patients was 38.1 years (median, 36 years). Fifty-four percent of these patients were women, 8.8% were African American, and 48.1% had private insurance. **Table 3** demonstrates the comparison of characteristics of African American vs Caucasian patients and characteristics of all patients (regardless of race) who received surgery vs those who did not. Five percent of African Americans with TLE received surgery compared with 10.2% of Caucasian patients with TLE (P<.001). Specific comparisons between patients who received ATL vs those who did not are depicted in **Table 4**.

Patient age, sex, race, primary payer for care, median income according to postal code of residence, and admission type were analyzed using univariate and multiple logistic regression (**Table 5** and **Table 6**). Multivariate analysis revealed that the variables independently predictive of reduced likelihood of receiving surgery were African Ameri-

Table 4. Clinical Characteristics of Patients With TLE From 1988 Through 2003 Comparing Receipt of ATL vs No Surgery

Characteristic	Patients, %			
	African American		Other Race	
	Received Procedure (n=27)	Did Not Receive Procedure (n=484)	Received Procedure (n=535)	Did Not Receive Procedure (n=4733)
Age, mean (SD), y	31.1 (8.6)	41.4 (16.3)	34.6 (9.5)	38.1 (13.8)
Median (range)	31 (18-47)	39 (18-92)	34 (18-65)	36 (18-100)
Female sex	48.2	61.8	54.0	53.1
Primary payer				
Private insurance	40.7	30.4	64.2	48.1
All others	59.3	69.6	35.8	51.9
Admission type				
Routine, birth, and others	88.5	67.4	93.8	82.3
Emergency/other/facility/court/law	11.5	32.6	6.2	17.7
Caseload of hospital				
Large bed size	81.5	77.1	70.0	69.3
Small or medium bed size	18.5	22.9	30.0	30.7
Surgeon volume				
Low	0		19.6	
High	100		80.4	
Median income[a]				
1	24.0	35.7	13.9	16.1
2	36.0	22.9	26.2	22.1
3	12.0	17.6	22.3	21.4
4	28.0	23.8	37.7	40.4
Region of hospital				
Northeast	14.8	32.2	20.2	30.3
North central	7.4	12.0	22.6	19.4
South	48.2	40.9	29.7	25.3
West	29.6	14.9	27.5	25.0

Abbreviations: ATL, anterior temporal lobectomy; TLE, temporal lobe epilepsy.
[a]For income brackets, see Table 2.

can race (OR, 0.56; 95% CI, 0.38-0.84; $P=.005$) and older age (OR, 0.98; 95% CI, 0.97-0.99; $P<.001$ per 1-year increase in age) (Table 6). Neither sex nor admission type were predictive of receiving ATL, while having private insurance increased the likelihood of receipt of ATL (OR, 1.85; 95% CI, 1.39-2.46; $P<.001$) (Table 6).

HOSPITAL AND SURGEON CHARACTERISTICS

Patients were treated at 789 hospitals; 70% were classified as having large bed size; 22.5%, medium; and 7.5%, small. Information on the treating surgeon was provided for 49.6% of the admissions, with 69 treating surgeons identified in the database. Hospital caseload (large vs small/medium bed size) was not independently predictive of receipt of surgery. Analysis of surgeon caseload revealed no difference between African American and Caucasian individuals in the caseload of the operating surgeon.

TRENDS OVER TIME

To optimally account for the federally mandated changes in addressing health care disparities in 1993 and 1996, comparisons of the data were made from 1988 to 1992 vs 1993 to 2003, and then from 1988 to 1995 vs 1996 to 2003. The 16-year period of this study was also divided into 3 time segments (1988-1992, 1993-1996, and 1997-2003) for further analysis. Analysis of ORs over time accounting for age, sex, race, insurance status, income, and hospital size revealed no significant differences over time in the predictive value of African American race, lack of private insurance status, and older age as being independently predictive of decreased likelihood of receiving surgery (**Figure**, A-C).

COMMENT

In this study, the largest to examine the issue of race and TLE surgery on a nationwide scale, several findings were revealed. The first, consistent with those of previous studies, is that of patients with intractable TLE, race is independently associated with a lower likelihood of receiving ATL; the findings from the present study revealed that African American race reduced the odds of receiving ATL for TLE by nearly 50%.[20] As previously shown,[28] there are many patient-centered and physician-centered factors that could account for this racial discrepancy. The first patient-centered factor, repeatedly demonstrated in previous qualitative studies, is that African American individuals tend to have a preference for nonsurgical management of chronic problems, expressing apprehension about surgery, wariness of specialists, and preference for "natural" remedies.[29,30] A previous study on patient perceptions of epilepsy showed that African American individuals tend to overestimate the risks and underestimate the benefits of epilepsy surgery.[30] The second patient factor, supported by numerous objective and subjective sources, is that African American patients tend to express mistrust of physicians.[31,32] The third patient factor is that African American individuals may experience a lower psychosocial effect of epilepsy than their Cauca-

Table 5. Univariate Analysis of the Association of Clinical Characteristics With Receipt of ATL for TLE

Characteristic	OR[a] (95% CI)	*P* Value[a]
Age (for 1-y increase)	0.97 (0.96-0.98)	<.001
Female sex	1.02 (0.79-1.31)	.89
African American vs other race	0.45 (0.32-0.62)	<.001
Admission type (routine vs birth and others)	3.77 (1.08-13.1)	.04
Primary payer (private insurance vs other)	1.97 (1.52-2.57)	<.001
Hospital bed size (large vs small or medium)	0.92 (0.57-1.48)	.72
Median income[b]		
1	1 [Reference]	
2	1.73 (1.16-2.58)	.03
3	1.29 (0.89-1.85)	.98
4	1.24 (0.84-1.81)	.73

Abbreviations: ATL, anterior temporal lobectomy; CI, confidence interval; OR, odds ratio; TLE, temporal lobe epilepsy.
[a] All ORs and *P* values are calculated using PROC SURVEYLOGISTIC in SAS.
[b] For income brackets, see Table 2.

Table 6. Analysis of the Association of Clinical Characteristics With Receipt of ATL for TLE Using Multiple Logistic Regression

Characteristic	Adjusted OR[a] (95% CI)	*P* Value[a]
Age (for 1-y increase)	0.98 (0.97-0.99)	<.001
Female sex	1.05 (0.82-1.34)	.70
African American vs other races	0.56 (0.38-0.84)	.005
Admission type (routine vs birth and others)	2.85 (0.81-10.0)	.10
Primary payer (private insurance vs other)	1.85 (1.39-2.46)	<.001
Hospital bed size (large vs small or medium)	0.92 (0.56-1.51)	.73
Median income[b]		
1	1 [Reference]	
2	1.60 (1.08-2.37)	.02
3	1.17 (0.81-1.69)	.98
4	1.00 (0.70-1.43)	.18

Abbreviations: ATL, anterior temporal lobectomy; CI, confidence interval; OR, odds ratio; TLE, temporal lobe epilepsy.
[a] All ORs and *P* values are calculated using PROC SURVEYLOGISTIC in SAS.
[b] For income brackets, see Table 2.

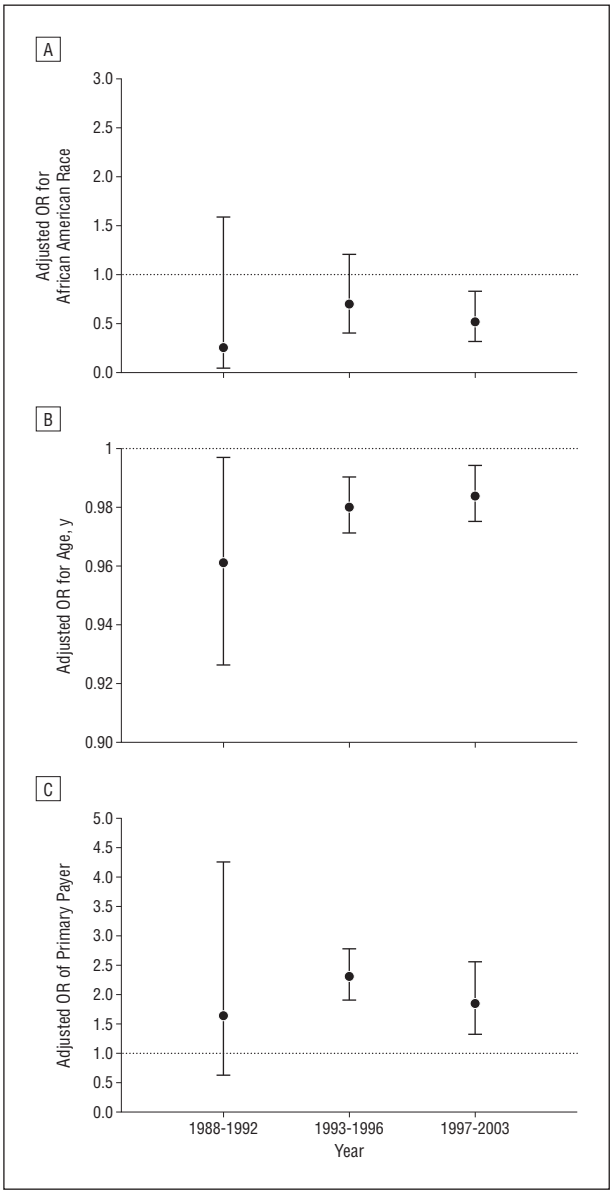

Figure. Plots of adjusted odds ratios (ORs) for 3 time periods. A, Plot of adjusted ORs for African American race for 3 time periods. The adjusted OR of receiving anterior temporal lobectomy (ATL) comparing African American individuals with those of other races from the multiple logistic regression for the time periods 1988 through 1992, 1993 through 1996, and 1997 through 2003 are 0.25 (95% confidence interval [CI], 0.04-1.59), 0.70 (95% CI, 0.40-1.20), and 0.51 (95% CI, 0.32-0.83), respectively. B, Plot of adjusted ORs for patient age for 3 time periods. The adjusted OR of receiving ATL with 1-year increase in age from the multiple logistic regression for the time periods 1988 through 1992, 1993 through 1996, and 1997 through 2003 are 0.96 (95% CI, 0.93-0.99), 0.98 (95% CI, 0.97-0.99), and 0.98 (95% CI, 0.97-0.99), respectively. C, Plot of adjusted ORs for the primary payer for 3 time periods. The adjusted OR of receiving ATL comparing private payer wither other payers from the multiple logistic regression for the time periods 1988 through 1992, 1993 through 1996, and 1997 through 2003 are 1.64 (95% CI, 0.63-4.26), 2.30 (95% CI, 1.91-2.77), and 1.84 (95% CI, 1.32-2.56), respectively.

sian counterparts. Previous study has shown that African American individuals with intractable epilepsy have lower anxiety, lower scores on the Beck Hopelessness Scale, and lower likelihood of suicidal ideation than patients of other races.[33,34] Consequently, it is tempting to conclude that the combination of these 3 factors among African American patients—preference toward nonsurgical management, mistrust of physicians, and lower effect of epilepsy—are largely or even solely responsible for the racial differences in receipt of epilepsy surgery.

The danger of this logic, as Griggs and Engel[28] note, is that such a conclusion inherently relieves the health care system of responsibility by saying that some disparities cannot (or even should not) be eliminated. Furthermore, there are several inherent flaws in this line of thinking. As previous study has shown, patient treatment preferences (regardless of race) are formed by the information provided to the patient about the treatment under consideration and the patient's previous experiences with the health care system.[28,35] Additionally, prior research on patient preferences has shown that preference difference accounts for only a small portion of differences in the rates of a particular procedure.[36]

The most common physician-centered factors previously reported are communication skills, character of information provided to the patient, and racial bias.[37-39] Communication skills in a race-discordant relationship have been shown to be shorter, less patient-centered, and restrictive of patient participation in decision making.[28,37] This may be owing to disparities in physician expectations of African American patients, as a recent study of more than 190 physicians revealed physicians' impressions of African American patients as having lower intelligence and being less compliant to medical recommendations than patients of other races.[38] Logic would suggest that such impressions invariably lead to disparities in the information provided to an African American patient regarding an invasive procedure, particularly one as invasive as ATL.

These physician-centered factors help provide an explanation for another major finding of this study: the racial disparities in receiving ATL remained stable over time (before vs after 1993 and 1996). Despite the investment of the federal government since 1993 to address racial health care disparities, the persistence of these disparities in receipt of surgery indicates that there is still much work to be done. The idea that racial differences in attitudes toward a procedure are inherent and immutable has been strongly undermined by previous study indicating that physician provision of accurate information, regardless of a patient's race, can eliminate these differences.[39] Therefore, it is possible that with the continued effort of primary care providers, neurologists, and neurosurgeons to provide equitable information to patients about invasive procedures regardless of race, over the next 16 years, the inequity between receipt of surgery by African American patients with TLE and those of other races will begin to narrow, as has been shown in a recent nationwide analysis of surgery for pediatric intractable epilepsy involving a much smaller sample size.[40]

Another interesting finding is that younger age independently predicted increased likelihood of surgery for TLE; of patients aged at least 18 years, the likelihood of receiving surgery decreased exponentially per additional year of life ($P < .001$; OR, 0.98). These findings indicate that each year of age affects the likelihood of surgery by $[(0.98^{\text{age of patient–age of comparison patient}}) - 1] \times 100$ in this patient population. Therefore, a 40-year-old patient with TLE is 2% less likely to receive ATL than a 39-year-old patient, 18% less likely than a 30-year-old patient, and 50% more likely than a 60-year-old patient. Interestingly, these findings are a reversal of the trend found in a nationwide analysis of surgery for pediatric TLE in which younger age was predictive of decreased likelihood of surgery.[40] This discrepancy is intriguing and merits further investigation.

A finding consistent with the previous analysis of pediatric TLE surgery is the independently predictive value of private insurance in receiving surgery; adult patients with TLE with private insurance were 85% more likely to receive ATL compared with patients insured by Medicare, Medicaid, self-pay, no charge, or other type of insurance ($P < .001$; OR, 1.85). Future attempts at bridging health care disparities will need to account for the importance of private insurance to achieve optimal success.

Finally, this study revealed conclusively that over a 16-year period, less than 10% of all patients with TLE received ATL. While the disparity between African American individuals and those of other races in receipt of ATL remains concerning, this alarmingly low number of patients with TLE who receive optimal treatment is a disturbing finding that must be addressed by physicians and the federal government to improve epilepsy care for all patients regardless of race, age, sex, or insurance status.

This study has several limitations, the most prominent of which is its retrospective nature and inclusion of only 35 US states. Furthermore, the reliance on the NIS allows for potential uncertainty regarding the case ascertainment accuracy for the database; it is possible that coding decisions were made by personnel with limited clinical expertise and may have been influenced by nonclinical factors such as reimbursement. Although it is uncertain whether this was the case with the NIS—a highly respected database represented for more than a decade in peer-reviewed publications in nearly all aspects of the medical field—the potential for such confounding inherently limits any study that relies on a broad nationwide database, including this study. Another limitation is the specificity of the *ICD-9* codes used and whether they are adequate to differentiate TLE from partial epilepsy of the frontal, parietal, or occipital lobes. While there is no stringent manner of determining for certain that all cases involved temporal lobectomy, the only partial epilepsy manifesting clinically as alteration/impairment of consciousness is TLE, as neither frontal, parietal, nor occipital lobe epilepsy typically present in this manner. The choice of procedure code 1.53 presumed that a surgeon would not perform a frontal, occipital, or parietal lobectomy for clinical manifestations well-known to be consistent with epilepsy and localized to the temporal lobe. Another concern is the relatively small sample size because the database involved 20% of US nonfederal hospitals over a 16-year period. However, only temporal resections were assessed, excluding most surgeries performed by epilepsy centers on an annual basis. Furthermore, the popularity and efficacy of epilepsy surgery has significantly grown since the first year of this study (1988), largely because the risk-benefit ratio of temporal lobectomy has become better understood and because class I evidence has clearly demonstrated the superiority of surgery over continued medical management in this patient population.[14] An additionally legitimate concern is that the NIS database does not allow for determination of which hospitals had epilepsy surgery teams in place; therefore, it is possible that the disparities in African American patients in this study may have been attributable solely to a disparate rate of admission to hospitals without epilepsy surgery programs. Finally, the NIS does not allow determination with certainty of the chronological relation between the *ICD-9* codes and the surgical procedure, thereby eliminating the possibility of performing analysis involving temporal association. Although unlikely, it is possible that lobectomy could have preceded the epilepsy, or that the lobectomy and epilepsy were unrelated.

Despite these limitations, this study reveals several important findings, providing evidence that a nationwide gap between African American patients and those of other races with regard to receipt of surgical care for TLE is present

and has remained relatively fixed over time. Future efforts in both patient and physician education will be necessary to adequately address this gap.

In the first nationwide examination of surgery for intractable TLE in adults, fewer than 10% of patients with TLE received ATL. Younger age and private insurance independently predicted receipt of ATL, with African American race independently predicting decreased likelihood of patients with TLE receiving ATL. These findings remained stable over a 16-year period despite increased federal government initiatives to address racial health care disparities implemented during the middle portion of the 16-year period. These results provide evidence that a nationwide gap between African American patients and those of other races with regard to receiving surgical care for TLE is present and has remained relatively fixed over time.

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Author Contributions: Dr McClelland 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 concept and design:* McClelland, Guo, and Okuyemi. *Acquisition of data:* McClelland. *Analysis and interpretation of data:* Guo and Okuyemi. *Drafting of the manuscript:* McClelland, Guo, and Okuyemi. *Critical revision of the manuscript for important intellectual content:* McClelland, Guo, and Okuyemi. *Statistical analysis:* Guo. *Obtained funding:* Okuyemi. *Administrative, technical, and material support:* McClelland. *Study supervision:* McClelland and Okuyemi.
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