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Revisiting racial disparities in access to surgical management of drug-resistant temporal lobe epilepsy post implementation of Affordable Care Act

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ABSTRACT

Objectives: Prior to enactment of the Affordable Care Act(ACA), several reports demonstrated remarkable racial disparities in access to surgical care for epileptic patients. Implementation of ACA provided healthcare access to 7–16 million uninsured Americans. The current study investigates racial disparity post ACA era in (1) access to surgical management of drug-resistant temporal lobe epilepsy (DRTLE); (2) short-term outcomes in the surgical cohort.

Patient and methods: Adult patients with DRTLE registered in the National Inpatient Sample (2012–2013) were identified. Association of race (African Americans and other minorities with respect to Caucasians) with access to surgical management of TLE, and short-term outcomes [discharge disposition, length of stay (LOS) and hospital charges] in the surgical cohort were investigated using multivariable regression techniques.

Results: Of the 4062 patients with DRTLE, 3.6%(n = 148) underwent lobectomy. Overall, the mean age of the cohort was 42.35 ± 16.33 years, and 54% were female. Regression models adjusted for patient demographics, clinical and hospital characteristics demonstrated no racial disparities in access to surgical care for DRTLE. Likewise, no racial disparity was noted in outcomes in the surgical cohort.

Conclusion: Our study reflects no racial disparity in access to surgical care in patients with DRTLE post 2010 amendment of the ACA. The seismic changes to the US healthcare system may plausibly have accounted for addressing the gap in racial disparity for epilepsy surgery.

1. Introduction

Racial and socioeconomic disparities have existed in the United States (US) healthcare system for decades [1]. Disparities in access to healthcare facilities for maintenance of chronic medical conditions, non-surgical interventions and surgical treatments have been exemplified in many previous studies [2–5]. These disparities are more profound for elective surgical procedures, both in receipt of surgery and post-surgical outcomes. In neurosurgery, disparities in access to neuro-oncologic care at high-volume hospitals and outcomes have been noted particularly in African Americans (AAs) and Hispanics as compared to Caucasian [6–8]. In utilization of deep brain stimulation (DBS) for patients with movement disorders, AAs were at lower odds of undergoing DBS [9]. Such disparities have been noted in other neurosurgical procedures such as those for craniosynostosis and cerebrovascular interventions [4,10,11].

Specific to temporal lobe epilepsy (TLE), previous national reports noted remarkable racial disparities in access to surgical care [12–16]. Patients with drug resistant TLE often require anterior temporal lobectomy (ATL) as a gold standard to lower morbidity and improve quality of life (QoL). Surgical lobectomy has a potential to achieve seizure free rates varying from 48 to 84% post-surgery [17–19]. Analysis by McClelland et al. on discharge-level data for the years 1998 through 2003 demonstrated remarkable racial disparity in access to ATL in patients with drug-resistant temporal lobe epilepsy (DRTLE) [15]. Using state-level data for California (2005–2009), Schiltz et al. observed racial disparities in access to specialized epilepsy care, especially those insured via publicly funded plans such as Medicare and Medicaid [12]. Recent healthcare reforms in the US healthcare system such as the Affordable Care Act (ACA) are focused on providing

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economically viable insurance plans amidst the backdrop of cost-containment. Estimates from various cross-sectional analyses reveal implementation of ACA to have provided health coverage to approximately 7–16 million uninsured Americans, with low-income population, young adults and minorities benefiting the most [20]. Recent article by President Obama in *JAMA* highlights the progress of ACA since its enactment including access and affordability to healthcare facilities [21]. The uninsured rate declined from 16% in 2010–9.1% in 2015, translating to a 43% reduction and concomitant increase in access to healthcare [21,22].

Although previous studies demonstrated racial disparity in epilepsy surgery prior to the amendment of ACA [12,15], the relative impact of ACA implementation in access to surgical care for patients with DRTLE is currently unknown. To assess the impact of recent seismic political reforms in reducing racial gaps in access to surgical management for DRTLE, the present study revisits racial disparity, if at all, using data obtained from the National Inpatient Sample (NIS) database. Further, we investigate impact of race on outcomes in patients with DRTLE that have surgical access.

2. Patient and methods

2.1. Study design and data source

A population-based, observational, cohort study was performed using the recently available National Inpatient Sample (NIS) databases for the years 2012 and 2013. The NIS is a part of the Healthcare Cost and Utility Project (HCUP) family of datasets designed by the Agency for Healthcare Research and Quality (AHRQ; Rockville, MD) [23]. It is the largest publicly available inpatient cohort that includes all-payer. For the years studied, the NIS represents a 20% sample of discharge records from all HCUP participating hospitals [23]. The clinical data is modelled using the International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM) codes into several diagnoses and procedures [24]. An overview of the data-source is available at http://www.hcup-us.ahrq.gov/nisoverview.jsp

2.2. Cohort definition

Records of adult patients (> 18 years) registered in the NIS with a diagnosis of DRTLE (ICD-9 diagnosis code: 345.41 or 345.51) were extracted. To define access to surgical management, patients were dichotomized into those undergoing lobectomy (ICD-9 procedure code: 01.53) versus those without any surgical intervention (Fig. 1).

2.3. Outcome endpoints

Our primary outcome of interest was access to surgical management in patients with DRTLE. Our secondary analysis extended to post-operative outcomes such as discharge disposition, length of stay (LOS), and hospital charges in patients undergoing lobectomy. Discharge disposition was dichotomized into routine and unfavorable discharge. Any discharge other than to home or home healthcare services was labelled as unfavorable. Likewise, metric outcomes such as LOS and hospital charges were also dichotomized. Patients with LOS and incurred hospital charges above the third quartile (> 75th percentile) were defined as having a prolonged LOS and high-hospital charges. For hospital-charge specific analysis, inflation adjustments to denote 2016 US dollar value using the national consumer price index was performed.

2.4. Exposures

Primary exposure of interest was racial differences (AAs and other minorities with reference to Caucasians) for defined primary and secondary endpoints. Variables included for risk-adjustment included age, sex, insurance status, median income quartile as defined by zip codes of residence, hospital characteristics such as bedsize and region, total number of inpatient procedures (NPR) and clinical comorbidities. For the latter, we performed stratification using the Charlson et al. comorbidity index (CCI) [25] as modified by Deyo et al. [26] to be used on ICD-9-CM codes [27].

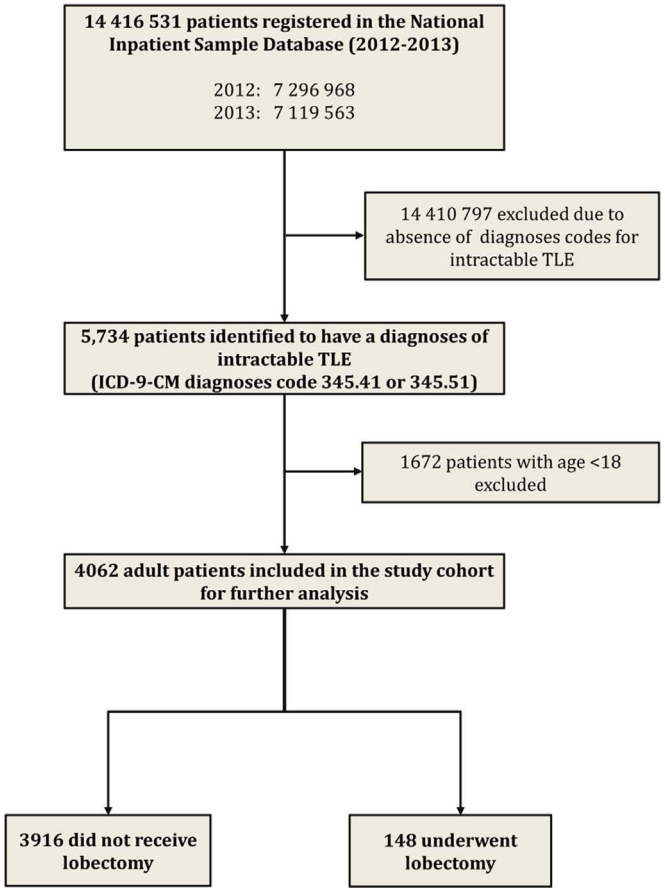

Fig. 1. Algorithm for cohort selection.

2.5. Statistical methods

Categorical data is presented as frequencies and proportions, while metric values as mean ± SD and/or median (IQR). Differences in the proportion of categorical variables across the three defined racial categories (Caucasian, African Americans and others), and across patients with surgical access versus those without it were assessed using the Pearson's χ^2 test or Fisher's exact test as appropriate. Differences in metric values across racial categories were analyzed using one-way ANOVA or the non-parametric Kruskal-Wallis test as appropriate, while across patients with or without surgical access via independent samples *t*-test or Wilcoxon-Rank Sum test.

The association of race with access to surgical management for DRTLE across the study cohort was investigated using three multivariable analytical models. Likewise, the impact of race with secondary outcomes (discharge disposition, LOS and charges) in the surgical cohort was investigated using similar models. First, we modelled our primary and secondary endpoints using an unadjusted model, followed by an adjusted analyses using the *logit* model. Lastly, we fitted our log-binomial model with generalized estimating equation (GEE) using the Huber and White sandwich-covariance matrix estimator to restrict clustering of outcomes within hospitals [28–31]. Risk adjustment was performed using all exposure variables described above.

We noted several exposures such as age (0.2%), race (8.7%), median household income quartiles (2.6%) and payer (0.2%) had missing