Racial disparities in neurologic health care access and utilization in the United States

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ABSTRACT

Objective: To evaluate racial and ethnic differences in the utilization of neurologic care across a wide range of neurologic conditions in the United States.

Methods: We analyzed nationally representative data from the 2006–2013 Medical Expenditure Panel Survey (MEPS), including information on demographics, patient-reported health conditions, neurology visit rates, and costs. Using diagnostic codes, we identified persons with any self-identified neurologic disorder except back pain, as well as 5 subgroups (Parkinson disease, multiple sclerosis, headache, cerebrovascular disease, and epilepsy). To assess disparities in neurologic care utilization, we performed logistic regression analyses of outpatient department neurologic care visit rates and expenditures for each racial ethnic group controlling for age, sex, health status, socioeconomic characteristics, and geographic region of care.

Results: Of the 279,103 MEPS respondents, 16,936 (6%) self-reported a neurologic condition; 5,890 (2%) received a total of 13,685 outpatient neurology visits. Black participants were nearly 30% less likely to see an outpatient neurologist (odds ratio [OR] 0.72, confidence interval [CI] 0.64–0.81) relative to their white counterparts, even after adjustment for demographic, insurance, and health status differences. Hispanic participants were 40% less likely to see an outpatient neurologist (OR 0.61, CI 0.54–0.69). Among participants with known neurologic conditions, blacks were more likely to be cared for in the emergency department, to have more hospital stays, and to have higher per capita inpatient expenditures than their white counterparts.

Conclusions: Our findings highlight racial and ethnic inequalities in the utilization of neurologic care in the United States. *Neurology*® 2017;88:2268–2275

GLOSSARY

ACA = Affordable Care Act; **AHRQ** = Agency for Healthcare Quality and Research; **CI** = confidence interval; **ED** = emergency department; **FPL** = federal poverty level; **MEPS** = Medical Expenditure Panel Survey; **MS** = multiple sclerosis; **OR** = odds ratio; **PD** = Parkinson disease.

Neurologic illness is common, affecting 14% of American households.¹ Approximately 1% of Americans have experienced a stroke, the leading cause of disability and the third most common cause of death in the United States.^{2,3} For those age 65 and older, 11% of Americans have Alzheimer disease and 1.6% have Parkinson disease (PD); the prevalence of both of these neurodegenerative disorders is expected to triple by 2050.^{2,4,5} The 1-year prevalence of other neurologic diseases per 1,000 Americans includes 121 for migraine, 7.1 for epilepsy, and 0.9 for multiple sclerosis (MS), the latter with a 50% increase over 25 years.² The dramatic increase in the prevalence of neurologic diseases is due, in part, to the availability of more sensitive diagnostic methods such as neuroimaging. However, longer lifespans and an aging population also contribute to the increased prevalence of neurodegenerative diseases.⁶

Neurologist involvement in the care of people living with neurologic illness reduces adverse events and acute care hospitalizations.⁷ Unequal access to neurologic services has been documented for a few neurologic diseases. For example, patients with MS who are black, physically

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disabled, lower income, uninsured, or living in rural areas are less likely to receive care by a neurologist.⁸ Stroke patients who are younger, female, Hispanic, or black are also less likely to access specialized neurologic care and treatments.^{9–11} Similarly among patients with PD, there are delays in diagnosis and symptomatic treatment as well as lower quality of life among less-educated, lower-income, non–privately insured, female, and racial minority patients.^{12–15} Yet no nationwide studies have examined disparities in the use of neurologic care for people with a broad range of neurologic conditions.

We analyzed 8 years of data from a nationally representative survey to assess patterns of neurologic care use in the United States.

METHODS **Data source and population.** We combined data from the 2006–2013 Medical Expenditure Panel Survey (MEPS). Carried out annually by the Agency for Healthcare Quality and Research (AHRQ), MEPS collects detailed information on health care utilization and expenditures for a nationally representative sample of the noninstitutionalized, civilian United States population. Details of the MEPS design and methods are available elsewhere.¹⁶

We examined the use of and expenditures for neurologic services as well as participants' neurologic diagnoses and demographics by linking the MEPS household component, medical conditions, and event files. For each individual, we tabulated their number of outpatient visits per year to neurologists at doctors' offices and hospital outpatient departments. Using MEPS clinical classification codes, which are based on providers' reports of up to 4 diagnoses per visit, we identified and tabulated visits for 5 specific neurologic conditions: PD, MS, headache, cerebrovascular disease, and epilepsy, and for any neurologic condition as detailed below. We were unable to separately analyze several important neurologic conditions either because data from the MEPS survey of noninstitutionalized persons included too few persons with the condition to allow for reliable estimates (e.g., in the case of dementia/delirium), or because clinical condition codes were too nonspecific, including a wide variety of diagnoses (as in the case of pain-related disorders). We tabulated the total expenditures associated with outpatient neurologist visits, including all payments by third-party payers, as well as participants' and families' out-of-pocket costs, and the costs of free care at public facilities (imputed by the National Center for Health Statistics).¹⁷ We adjusted all costs to 2013 dollars using the consumer price index for all urban consumers.¹⁸

We also tabulated inpatient stays and emergency department (ED) visits and their related expenditures for the neurologic conditions described above, as well as those associated with any neurologic condition code.

In secondary analyses, we tabulated outpatient visits to psychiatrists, occupational therapists, or physical therapists. To avoid confounding by orthopedic-related visits, we only considered such visits neurology-related if a neurologic clinical condition code (079–085, 093, 095, 109–110, 112–113, 216, 233, 653) was among the 4 condition codes for that visit (see code list in

appendix 2 of meps.ahrq.gov/mepsweb/data_stats/download_data/pufs/h154/h154doc.pdf).

To assess the neurologic disease burden of various segments of the population, we tabulated neurologic conditions that respondents self-reported in any of the MEPS data collection components, which the MEPS staff classified into self-diagnosis clinical condition codes and ICD-9 codes. We used these codes to identify persons with self-identified PD, MS, cerebrovascular disease, headache, and epilepsy. To identify individuals with any self-identified neurologic disease, we used ICD-9 codes 320–337, 339–359 and 430–438.

We examined visit rates and per capita expenditures for neurologic care according to several demographic characteristics. We categorized participants' self-identified race and ethnicity as white non-Hispanic, black non-Hispanic, or Hispanic of any race (hereinafter, white, black, and Hispanic); we excluded Asians and persons of other or mixed race because the MEPS sample yielded excessively wide confidence intervals for those groups. We categorized age as under 18, 18–34, 35–64, and 65 years or over. We tabulated family income in relation to the federal poverty level (FPL) and categorized participants as poor (less than 100% of FPL), near-poor (100%–124% of FPL), low income (125%–199% of FPL), middle income (200%–399% of FPL), or high income (more than 399% of FPL). We classified participants' education as less than high school, high school or general educational development, some college, or bachelor's degree or above. We categorized their health insurance as Medicare, with or without other coverage; private insurance, excluding persons with concurrent Medicare coverage; Medicaid, including those with any other public coverage but excluding persons with concurrent private insurance or Medicare; and uninsured. We included participants' self-reported health status measured on a 5-point scale: excellent, very good, good, fair, or poor. We considered persons who reported being born outside the United States as immigrants.

Statistical analyses. To assess the influence of race and ethnicity, income, and education on access to outpatient neurologist care, we constructed 5 logistic regression models with receipt of any outpatient neurologist visit during the year as the outcome variable. In the first of these models, we included (1) only race/ethnicity, age, and sex. In subsequent models, we added sequentially controls for (2) the presence of any self-reported neurologic condition; (3) any limitation in activity, and self-reported overall health status; and (4) health insurance coverage, family income, education, immigrant status, and geographic region of care.

We constructed a 5th model identical to model 4 (our full model) but excluding self-reported neurologic diagnosis. We did this to address issues of possible reverse causality, i.e., that some persons with a neurologic illness may not be aware of their diagnosis unless they have seen a neurologist. Among populations with low neurologic visit rates, controlling for self-reported neurologic diagnosis might lead to an underestimation of disparities. Interpretation of this final model requires the reasonable but unproven assumption that the overall rate of neurologic illness among socially disadvantaged persons is not lower than among other persons of similar age and sex.

Finally, we performed several supplementary multivariate analyses to examine whether racial/ethnic disparities were present among Medicare-insured persons; whether disparities in access to primary care explained the disparities in the receipt of neurologic care; and the impact of immigration status, which was not included in our main analysis because MEPS did not have immigrant status data for several of the study years. In addition, we repeated our main analyses focusing on cerebrovascular disease

Table 1 Share of community-dwelling US individuals receiving one or more outpatient-based neurology visits during the year by demographic characteristics, 2006–2013 (n = 5,890)

Demographic group	Percent with at least one neurologist visit (95% CI)
Sex	
Male	2.33 (2.19–2.46)
Female	2.98 (2.82–3.14)
Age, y	
<18	1.12 (0.99–1.25)
18–34	1.29 (1.13–1.44)
35–64	3.24 (3.06–3.42)
65+	6.28 (5.87–6.70)
Race/ethnicity	
Hispanic	1.18 (1.07–1.30)
Asian	1.36 (1.07–1.64)
Black	2.06 (1.86–2.27)
White	3.26 (3.12–2.40)
Immigrant	
Yes	1.60 (1.39–1.82)
No	2.85 (2.72–2.98)
Education level^a	
Less than high school	2.55 (2.28–2.81)
High school/GED	3.22 (2.96–3.49)
Some college	3.31 (3.06–3.56)
College and above	3.52 (3.26–3.78)
Income level	
Poor	2.31 (2.10–2.52)
Near poor	2.48 (2.12–2.85)
Low income	2.60 (2.35–2.85)
Middle income	2.46 (2.30–2.62)
High income	3.01 (2.83–3.19)
Insurance coverage	
Uninsured	0.74 (0.63–0.85)
Medicaid and other public	1.83 (1.63–2.03)
Medicare	7.05 (6.63–7.48)
Private only	2.16 (2.04–2.28)
Metropolitan area	
Yes	2.63 (2.52–2.75)
No	2.74 (2.44–3.05)
Geographic region	
Northeast	2.99 (2.71–3.28)
Midwest	2.71 (2.52–2.89)
South	2.77 (2.58–2.95)

Continued

Table 1 Continued

Demographic group	Percent with at least one neurologist visit (95% CI)
West	2.18 (1.99–2.37)

Abbreviations: CI = confidence interval; GED = general educational development.

^aComputed for patients ages 18 and above.

and epilepsy as these were the 2 largest self-reported diagnoses. Because data on immigrant status were not included in MEPS for several of the study years, we included this variable only in supplementary multivariate analyses.

All of the tables we present represent annual averages for 2006–2013, derived using weights provided by the AHRQ that allow extrapolation to the civilian noninstitutionalized US population.

Using procedures that account for MEPS' complex sample design, we conducted all statistical analyses for this article using SAS version 9.4 (SAS Institute Inc., Cary, NC). The institutional review board at the City University of New York waived review of this project.

RESULTS Our sample included 279,103 MEPS participants surveyed between 2006 and 2013 (table 1). A total of 16,936 participants self-reported living with a neurologic condition, including at least 3,338 with cerebrovascular disease, 2,236 with epilepsy, 399 with MS, and 397 with PD. Other persons with self-reported neurologic conditions had a wide range of less common diagnoses, or relatively nonspecific complaints. The 5,890 participants who completed at least one outpatient visit to a neurologist made a total of 13,685 visits during the study period.

Participants with at least one outpatient neurologist visit were more likely to be female, older, white, nonimmigrant, more educated, higher income, Medicare or privately insured, and Northeast region residents (table 1). Clinically, patients who completed at least one outpatient neurology visit were more likely to carry neurologic diagnoses such as MS, PD, or epilepsy and to report fair or poor overall health, fair or poor mental health, and functional limitations in activity (table 2).

The multivariate logistic regression model that controlled only for age and sex showed markedly lower neurology visit rates for black participants (odds ratio [OR] 0.73, confidence interval [CI] 0.65–0.92) and Hispanic participants (OR 0.47, CI 0.42–0.52) compared to white participants (table 3). The racial and ethnic disparities in neurology visit rates were also significant in all of the other models. In the model controlling for age, sex, activity limitation, self-reported health status, health insurance coverage, family income, education, and region (model 5), black participants (OR 0.72, CI 0.64–0.81) and Hispanic participants (OR 0.61, CI 0.54–0.69)

Table 2 Share of all community-dwelling US individuals receiving one or more office-based or outpatient-based neurology visits during the year by clinical characteristics, 2006–2013

Known, self-reported neurologic illness	Percent with any neurologist visit (95% CI)
Any neurologic diagnosis	16.19 (15.33–17.06)
No neurologic diagnosis	1.56 (1.49–1.63)
By specific diagnosis	
Parkinson disease	56.03 (50.48–61.58)
Multiple sclerosis	71.36 (67.10–75.61)
Epilepsy	38.29 (35.47–41.11)
Headache	10.93 (10.10–11.76)
Cerebrovascular disease	17.85 (15.82–19.88)
Self-reported overall health	
Excellent	0.87 (0.77–0.98)
Very good	1.72 (1.59–1.85)
Good	3.41 (3.19–3.62)
Fair	8.04 (7.50–8.58)
Poor	13.0 (11.85–14.22)
Any activity limitation	
Yes	7.71 (7.31–8.10)
No	1.31 (1.28–1.44)
Self-reported mental health	
Excellent	1.56 (1.44–1.68)
Very good	2.26 (2.09–2.43)
Good	3.74 (3.51–3.97)
Fair	7.94 (7.29–8.60)
Poor	9.06 (7.64–10.49)

Abbreviation: CI = confidence interval.

remained significantly less likely to receive an outpatient neurology visit. Although not the primary focus of our analyses, in our final model (model 5) we also observed that less educated (OR 0.46, CI 0.40–0.54), poor (OR 0.68, CI 0.60–0.78), and uninsured persons (OR 0.40, CI 0.33–0.48) were less likely to have seen an outpatient neurologist. Persons with Medicare coverage (OR 1.82, CI 1.55–2.14) and those residing in the Northeast (OR 1.24, CI 1.09–1.41) were more likely to have seen an outpatient neurologist. As expected, adding an indicator of whether or not respondents reported that they had a neurologic diagnosis (model 4) somewhat attenuated some of the ORs for disparities but these remained statistically significant. Additional models that controlled for immigration status did not significantly change model results (data not shown).

In exploratory models evaluating the effect of whether participants reported a usual source of care

(a proxy for access to primary care), this variable strongly predicted the likelihood of participants having any neurologic outpatient visit; however, the racial ethnic and insurance disparities persisted in these models (data not shown).

In subgroup analyses, racial/ethnic disparities in the odds of having an outpatient neurology visit were somewhat larger among individuals with self-reported cerebrovascular disease, and somewhat smaller among persons with epilepsy; insurance-related disparities were similar to those observed in our main models (data not shown).

Marked racial/ethnic disparities persisted in analyses limited to persons with Medicare coverage, with ORs that differed little from the results based on the entire population (data not shown). Among persons with known neurologic conditions, black participants were more likely to have been seen in the ED, to have more hospital stays, and to have higher per capita hospitalization expenditures than white participants (table 4). Black participants had 12.55 ED encounters per 100 persons with a neurologic condition (CI 10.52–14.58), relative to 7.66 for Hispanic participants (CI 6.23–9.08) and 7.70 for white participants (CI 6.91–8.68). For inpatient discharges, black participants had 9.39 (CI 7.49–11.28) encounters per 100 persons with a neurologic condition, relative to 4.69 (CI 3.22–6.16) for Hispanic participants and 4.50 (CI 3.89–5.12) for white participants.

DISCUSSION Our findings document substantial racial and ethnic disparities in neurologic health care access and utilization in the United States, as well as gaps in care for poor, uninsured, and less-educated Americans. These disparities are concerning not only because racial and ethnic minorities represent 28% of Americans and will become half of the United States population by 2040, but because all Americans should have equitable access to health care regardless of who they are, where they live, or what resources they have.¹⁹

We suspect that the causes of racial/ethnic differences in neurology health care access and utilization are multifactorial. Patients and their families may mistrust or misunderstand the health care system, have differing cultural beliefs and attitudes about aging and disease, or have limited social supports and resources to facilitate disease recognition and make informed decisions about their health.^{14,20–23} For example, people may attribute cognitive or mobility decline to normal aging and delay seeking evaluation and care for neurodegenerative diseases.^{14,20} Stroke survivors may not recognize the importance of preventing further strokes by modifying risk factors such as smoking, hypertension,

Table 3 Predictors of receipt of any office-based or outpatient-based neurologist visit, 2006–2013

	Model 1, OR (95% CI)	Model 2, OR (95% CI)	Model 3, OR (95% CI)	Model 4, OR (95% CI)	Model 5, OR (95% CI)
Male (reference = female)	0.81 (0.75–0.88)	0.97 (0.89–1.05)	0.92 (0.77–1.11)	0.94 (0.78–1.13)	0.84 (0.77–0.91)
Age, y (reference ≥65 y)					
<18	0.19 (0.17–0.23)	0.33 (0.28–0.39)	0.59 (0.41–0.85)	1.30 (0.33–5.08)	1.33 (0.80–2.21)
18–34	0.22 (0.19–0.25)	0.31 (0.26–0.36)	0.50 (0.35–0.71)	0.69 (0.45–1.06)	1.02 (0.82–1.27)
35–64	0.54 (0.49–0.59)	0.64 (0.58–0.71)	0.91 (0.72–1.16)	1.05 (0.73–1.51)	1.34 (1.15–1.56)
Race ethnicity (reference = white)					
Black	0.73 (0.65–0.92)	0.79 (0.71–0.89)	0.60 (0.48–0.73)	0.67 (0.54–0.83)	0.72 (0.64–0.81)
Hispanic	0.47 (0.42–0.52)	0.54 (0.49–0.61)	0.45 (0.35–0.57)	0.69 (0.53–0.90)	0.61 (0.54–0.69)
Any self-reported neurologic condition (reference = none)		9.33 (8.54–10.18)	10.64 (8.59–13.18)	10.21 (8.19–12.73)	OMITTED
Limitation in any activity (reference = none)			2.01 (1.52–2.66)	2.19 (1.63–2.94)	2.82 (2.55–3.12)
Self-reported health status (reference = excellent)					
Very good			0.90 (0.63–1.28)	0.85 (0.60–1.20)	0.73 (0.50–1.09)
Good			0.56 (0.39–0.81)	0.49 (0.34–0.71)	0.40 (0.27–0.60)
Fair			0.35 (0.23–0.52)	0.28 (0.19–0.41)	0.23 (0.15–0.34)
Poor			0.20 (0.12–0.32)	0.15 (0.09–0.24)	0.14 (0.09–0.21)
Education (reference = bachelor degree or higher)					
Some College				0.82 (0.63–1.06)	0.81 (0.72–0.92)
High school or GED				0.76 (0.59–0.98)	0.67 (0.59–0.76)
Less than high school				0.52 (0.37–0.73)	0.46 (0.40–0.54)
Family income (reference = high income)					
Poor				0.74 (0.57–0.98)	0.68 (0.60–0.78)
Near poor				0.67 (0.44–1.00)	0.62 (0.52–0.74)
Low income				0.73 (0.54–0.97)	0.77 (0.68–0.87)
Middle income				0.76 (0.61–0.96)	0.81 (0.73–0.90)
Insurance (reference = private)					
Medicare				1.09 (0.74–1.61)	1.82 (1.55–2.14)
Medicaid				0.72 (0.49–1.06)	1.04 (0.89–1.21)
Uninsured				0.37 (0.24–0.57)	0.40 (0.33–0.48)
Region (reference = West)					
Northeast				1.93 (1.39–2.67)	1.24 (1.09–1.41)
Midwest				1.51 (1.11–2.05)	1.06 (0.95–1.19)
South				1.69 (1.29–2.21)	1.19 (1.06–1.33)

Abbreviations: CI = confidence interval; GED = general educational development; OR = odds ratio.

dyslipidemia, and diabetes.^{24,25} People living with epilepsy may know that they have seizures but may not be aware of their potential implications and available treatments.²⁶

The way our health system is organized and financed may also constrain minority patients' access to outpatient neurologic services.²⁷ Our analyses that incorporated an indicator of access to primary care suggested that such access facilitates access to outpatient neurology care, but accounts for a small

proportion of the racial/ethnic and insurance disparities that we observed. Institutions that provide primary care for minority patients may not offer neurology outpatient services, complicating referrals and potentially compromising outcomes.²⁸ Health systems may not provide meaningful language assistance for non-English-speaking patients, impeding clinicians' understanding of patients' complaints or patients' understanding of clinicians' assessments and recommendations.²⁹ Language barriers predominantly

Table 4 Annual health care utilization of persons with known neurologic conditions according to race and ethnicity, 2006–2013

	Non-Hispanic white (n = 10,133)	Non-Hispanic black (n = 3,102)	Hispanic (n = 2,711)
Office-based neurologist visits			
Percent of persons with an encounter	17.21 (16.17–18.25)	14.38 (12.55–16.21)	10.79 (9.42–12.16)
No. of encounters per 100 persons with a neurologic condition	43.16 (39.71–46.60)	34.77 (28.67–40.87)	27.01 (20.97–33.04)
Cost per person with a neurologic condition	\$138.78 (113.18–164.39)	\$104.10 (81.16–127.04)	\$64.30 (28.78–99.82)
Office-based physiatrist visits			
No. of encounters per 100 persons with a neurologic condition	0.95 (0.34–1.57)	1.59 (0.39–2.79)	3.02 (0.94–5.09)
Office-based physical and occupational therapist visits for a neurologic diagnosis			
No. of encounters per 100 persons with a neurologic condition	34.22 (25.90–42.54)	34.61 (22.36–46.85)	36.13 (0–73.78)
Emergency department visits for a neurologic diagnosis			
No. of encounters for a neurologic diagnosis per 100 persons with a neurologic condition	7.70 (6.91–8.68)	12.55 (10.52–14.58)	7.66 (6.23–9.08)
Hospital inpatient discharges			
No. of encounters for a neurologic diagnosis per 100 persons with a neurologic condition	4.50 (3.89–5.12)	9.39 (7.49–11.28)	4.69 (3.22–6.16)
Per capita cost, USD	\$598.98 (486.88–711.08)	\$1,485.21 (1,103.03–1,867.40)	\$576.36 (329.39–823.33)

burden Hispanic participants and Asian participants, but many other immigrant groups also face linguistic hurdles; 20% of Americans speak languages other than English.²⁹

The geographic distribution of outpatient neurology services may also compromise access and utilization for some minority patients. The Southeastern United States region, home to many African Americans and dubbed the stroke belt because of the high prevalence of cerebrovascular disease, has markedly fewer outpatient neurologists per capita than the Northeast.³⁰ At a state level, California, the state with the largest minority population, has fewer than 4 neurologists per 100,000 residents, while Massachusetts, a state with less racial and ethnic diversity, has 8 neurologists per 100,000 residents.³¹

Bias, stereotyping, and clinical uncertainty may also underlie our findings.^{27,28,32,33} For example, implicit racial bias has been shown to result in disparate management of patients requiring life-saving cardiac therapies.³²

While we found low outpatient neurology visit rates for minorities, blacks had higher neurology-related ED visit rates, inpatient hospitalizations, and hospitalization costs than white participants. These findings are consistent with other studies. For example, racial and ethnic minority stroke

patients have higher average length of stay and inflation-adjusted charges, in part because they are more likely to receive life-sustaining interventions such as mechanical ventilation despite receiving thrombolysis less often.³⁴ Rates of ED and inpatient care use may also be influenced by insurance coverage (which affects prehospital access to care as well as discharge destinations), and poor health literacy, which is more common among elderly, minority, poor, and less-educated persons.³⁵

Racial and socioeconomic disparities also exist in the likelihood of being treated at high-volume hospitals, which have better outcomes.³⁶ When racial and ethnic minorities and poor patients receive stroke care at high-volume hospitals, they do so in a delayed fashion, which is associated with worse outcomes.³⁶

Our study has several limitations. Although the MEPS is representative of the US noninstitutionalized population, it excludes people living in nursing homes, prisons, and other institutional settings where many patients with seizures or dementia reside.¹⁶ While patients' reports of visits are verified with providers, as are the diagnoses associated with each visit, recall bias may affect patients' reports. Limitations of the MEPS diagnosis coding limited our ability to specifically assess disparities in care for some diagnoses (e.g., back pain and chronic pain), although any

patient with a neurologist visit would be included in our data. Further, the MEPS' limited sample size precluded analyses of smaller racial and ethnic groups, an unfortunate omission since Asians and Pacific Islanders as well as American Indians may have a considerable burden of neurologic diseases and inadequate access to outpatient neurology services.^{26,37} Although MEPS allowed us to account for many important variables, its clinical data are limited and do not include information on patients' and clinicians' attitudes. Finally, while we would have liked to evaluate the influence of the Affordable Care Act (ACA), the post-ACA MEPS data include too few neurology visits to produce a reliable estimate of changes associated with the ACA.

Despite these limitations, our findings convincingly demonstrate inequities in outpatient neurologic care in the United States, and highlight the need for further work to characterize and address barriers to care for people living with neurologic disorders. Future studies that elucidate reasons for persistent racial/ethnic differences in neurology access and resource utilization will be crucial in helping to eliminate these disparities. Importantly, our study adds to, and is generally concordant with, studies on disparities in care provided by other specialties. For example, Hispanic, low-income, and uninsured adults with multiple chronic conditions reported more difficulty accessing specialty care than other persons.³⁸ Black and Hispanic children and youth have markedly lower psychiatric visit rates than non-Hispanic white children.³⁹

Remediating disparities will require that neurologists engage with policy discussions regarding health insurance coverage and interventions to improve access. Neurologists should also participate in initiatives to educate hospital staff about bias and multicultural care, increase the proportion of underrepresented minorities in the neurology workforce, improve patient education and literacy regarding neurologic illness, and transform institutional practices to assure more equitable neurologic care.

AUTHOR CONTRIBUTIONS

Dr. Saadi: analysis and interpretation of the data, drafting and revising the manuscript for intellectual content. Dr. Himmelstein: design or conceptualization of the study, analysis and interpretation of the data, critical revision of manuscript for intellectual content. Dr. Woolhandler: design or conceptualization of the study, analysis and interpretation of the data, critical revision of manuscript for intellectual content. Dr. Mejia: design or conceptualization of the study, analysis and interpretation of the data, critical revision of manuscript for intellectual content, study supervision.

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