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Race and the emergency department management of febrile seizures

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Abstract

To determine if racial disparities exist in the management of febrile seizures in a large pediatric emergency department (ED), We performed a retrospective cross-sectional analysis of children 6 months to 6 years-old who presented to the ED with a febrile seizure over a 4-year period. Multivariate logistic regression models were built to examine the association between race and the primary outcome of neuroimaging, and secondary outcomes of hospital admission and abortive anticonvulsant prescription at ED discharge. There were 980 ED visits during the study period. Overall, 4.0% of children underwent neuroimaging and 11.1% were admitted. Of the 871 children discharged from the ED, 9.4% were prescribed an abortive anticonvulsant. There were no differences by race in neuroimaging or hospital admission. However, black children were less likely to be prescribed abortive anticonvulsants (adjusted odds ratio [aOR] 0.47; 95% confidence interval [CI]: 0.23–0.96) compared to non-black peers, when adjusting for demographic and clinical confounders. Stratification by insurance revealed that this disparity existed in Medicaid-insured patients (aOR 0.33, 95% CI: 0.14–0.78) but not in privately-insured patients. We found no racial disparities in neuroimaging or hospital admission among ED patients with febrile seizures. We did find racial disparities in our secondary outcome of abortive anticonvulsant prescription, driven primarily by individuals on Medicaid insurance. This pattern of findings may reflect the lack of standardized recommendations regarding anticonvulsant prescription, in contrast to the guidelines issued for other ED management decisions. Further investigation into the potential for treatment guidelines to reduce racial disparities is needed.

Abbreviations: AA = African American, AAP = American Academy of Pediatrics, aOR = adjusted odds ratio, CI = confidence interval, ED = emergency department, EMR = electronic medical record, ICD-10 = international classification of diseases, tenth revision, ICD-9 = international classification of diseases, ninth revision.

Keywords: abortive anticonvulsant, hospital admission, insurance, neuroimaging, racial disparities, standardized treatment guidelines

1. Introduction

Race and ethnicity-based healthcare disparities are "observed differences in quality of healthcare by race/ethnicity that are not due to access to care, clinical needs, patient preferences, or appropriateness of the intervention."[1] These disparities are increasingly recognized in pediatric emergency care. For example, compared to their white counterparts, black children are assigned lower acuity triage scores,[2,3] experience longer wait times in the emergency department (ED),[3–5] and are less likely to receive analgesia for abdominal pain.[6] White children conversely receive more laboratory and radiology testing during ED visits,[3,7–10] more diagnostic procedures for chest pain,[11] and are more likely to be admitted to the hospital overall,[12] compared to nonwhite minorities. However, data on race/ethnicity-based disparities in the management of other common ED diagnoses remain limited.[3,6,9,11,13]

Febrile seizures are a common diagnosis in children presenting to the ED,[14] affecting 2% to 5% of all children between the ages of 6 and 60 months.[14,15] Although the American Academy of Pediatrics (AAP) has evidence-based recommendations for the diagnosis and management of simple febrile seizures regarding when to obtain neuroimaging, routine blood studies, and electroencephalograms,[15–17] there continues to be significant variability in the ED management of both simple and complex febrile seizures.[18–20] One study recently demonstrated that among 1 million annual seizure visits to the ED, black patients of all ages were less likely to receive neuroimaging or be admitted

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to the hospital than white patients matched on demographic, clinical, and socioeconomic status.[21] No similar data exist for febrile seizures.

To address these gaps in knowledge and add to the growing literature on racial disparities, we sought to determine if racial disparities are present in the management of febrile seizures at a large United States pediatric tertiary care ED by assessing the proportion of children who undergo neuroimaging. We secondarily investigated whether there were differences in the proportion of children who are admitted to the hospital and who are prescribed abortive anticonvulsant medications at ED discharge.

2. Materials and Methods

2.1. Study design

We performed a retrospective cross-sectional descriptive study of children presenting to the ED at Children's Hospital of Philadelphia, a large, academic tertiary care children's hospital. This study was exempted from our institution's Institutional Review Board with a waiver of informed consent (4/12/2019).

2.2. Data collection and study population

We queried the electronic medical record (EMR) for ED encounters with a diagnosis of febrile seizure (*International Classification of Diseases, Tenth Revision* [ICD-10] codes R56.00 or R56.01, *International Classification of Diseases, Ninth Revision* [ICD-9] codes 780.31 or 780.32) or a diagnosis of fever (ICD-10 codes R50 or B34.9, ICD-9 codes 780.6, 790.8, 079.99) and seizure (ICD-10 codes R56.9 or G40, ICD-9 codes 345.x or 780.39), among children 6 months to 6.0 years old between June 1, 2014 and May 31, 2018. Children who were evaluated more than once for a febrile seizure diagnosis during the study time period contributed multiple independent data points. We excluded children with past medical histories that precluded a true diagnosis of febrile seizure,[22] defined by ICD-9/10 codes in the EMR at or before the time of ED evaluation, including: history of neurologic disease such as epilepsy, developmental delay, or intracranial pathology; history of ventriculoperitoneal shunt; history of known genetic syndrome associated with epilepsy. We similarly excluded children with a history of immunodeficiency, or cardiac, oncologic, or other complex underlying disease given a higher risk for underlying neurologic pathology or infection to have caused the seizure (see Table, Supplemental Digital Content 1, http://links.lww.com/MD/H722, for ICD-9/ICD-10 codes). We excluded children who were transferred from or were previously seen at other hospital EDs or urgent care centers for febrile seizure, as they might have been managed differently due to their prior workup. We finally excluded children between 5.0 and 6.0 years of age presenting with their first-time febrile seizure, following our institutional definition of febrile seizure.[23] Extracted data included demographic features, ED encounter characteristics, and clinical variables (see "Covariates" section). Our study team manually reviewed data in the EMR to verify inclusion/exclusion, suspected errors, and missing data, confirm accuracy of extracted data, and collect further clinical data.

2.3. Predictor variables

Race was defined by caregiver self-report during the ED patient registration process according to United States Census categories. Because the majority of patients were white or black/African American (AA), we collapsed race into a binary variable of black/AA (henceforth referred to as black) versus non-black/AA for our analyses.

2.4. Outcome variables

Our outcome variables were dichotomous. Our primary outcome variable was whether or not neuroimaging (head computed tomography and/or magnetic resonance imaging) was performed in the ED. Our secondary outcome variables were admission to the hospital (observation unit or floor) and abortive anticonvulsant medication (benzodiazepine) prescription at ED discharge, which included new prescriptions or notation that prescription was unnecessary because an active abortive anticonvulsant prescription already existed.

2.5. Covariates

We examined patient demographics, ED encounter characteristics, and clinical variables as potential confounders. Demographic variables reported by caregivers at registration included age, sex, insurance type (private vs Medicaid), ethnicity, and preferred language (English vs not English). Clinical variables were abstracted from the EMR. Triage score was assigned by an ED nurse according to the 5-level Emergency Severity Index (ESI) algorithm[24] (scores of 4 and 5 were grouped together given small numbers and similar clinical acuity). Seizure classification reflected the ED provider's determination of the seizure as simple, complex, or unknown (grouped as complex vs not complex).[17]

2.6. Statistical analysis

Data were analyzed using non-parametric methods in STATA 15.1 (College Station, TX). Continuous variables were described using medians and interquartile range (IQR) and compared across race categories using the Wilcoxon rank-sum test. Categorical variables were described using counts, frequencies, and proportions, and were compared across race categories using the chi-squared test. Statistical significance was determined a priori as a 2-tailed P value <.05.

Multivariable logistic regression models were built to examine the association of race with primary and secondary outcome variables. Initial models were constructed including ethnicity, age, sex, insurance, and preferred language a priori, and other covariates with a P value <.20 on univariate analysis (Table 1). Variables included a priori were retained, given their potential direct impact on the associations of interest. Variables confounding the relationship between race and outcome (≥10% change in beta coefficient when removed) were also retained. Other covariates that did not retain significance in the adjusted model ($P > .05$) were eliminated in a step-wise fashion. Effect modification of the association between race and outcome variables by insurance type was a priori examined in all models.

Secondary analysis to examine the association between abortive anticonvulsant prescription at ED discharge for first-time febrile seizure and the proportion of children who revisited the ED during the study period for febrile seizure was also performed using the chi-squared test. Additionally, to account for the possibility that the proportion of febrile seizure revisits would be artificially depressed if a child was more likely to return to a different local ED rather than our large referral center, a sensitivity analysis was performed using a "neighborhood cohort," defined using thirteen local zip-code areas with high referral rates to our institution.[25]

3. Results

We included 980 ED visits during the study time period, 589 of which (60.1%) were from black children. Demographic, ED encounter, and clinical characteristics for the whole sample as well as the sample stratified by race are summarized in Table 2. Notably, black children were slightly older, more likely to have

Table 1

Univariate logistic regression analyses. Variables with bolded results (*P* < .20) were included in multivariate logistic regression models.

	Neuroimaging performed*		Admitted to hospital*		Prescribed abortive anticonvulsants†	
Parameter	**OR**	***P***	**OR**	***P***	**OR**	***P***
Predictor						
Race						
Non-Black	Reference					
Black	0.69	.25	0.94	.75	**0.45**	**.001**
Covariates						
Age (in mo)‡	0.98	.25	**0.97**	**.002**	**1.03**	**<.001**
Sex						
Male	Reference					
Female	1.10	.78	1.13	.56	1.34	.21
Insurance						
Private	Reference					
Medicaid	0.72	.34	0.97	.88	**0.64**	**.07**
Ethnicity						
Non-Hispanic/Latino	Reference					
Hispanic/Latino	**2.01**	**.16**	1.05	.90	1.27	.57
Preferred language						
Not English	Reference					
English	**0.41**	**.15**	1.30	.67	**0.41**	**.06**
Means of arrival to ED						
Personal transportation	Reference					
EMS	**1.67**	**.17**	1.04	.86	0.84	.53
Other	0.76	0.79	0.42	.25	1.17	.78
Triage						
1-critical	**18.00**	**<.001**	**11.57**	**<.001**	2.08	.54
2-acute	**0.46**	**.18**	0.65	.24	1.70	.33
3-urgent	**0.12**	**.01**	**0.38**	**.02**	0.86	.78
4 & 5-semi-urgent/non-urgent	Reference					
Prior ED visit(s) for febrile seizure	1.14	.73	1.15	.54	**4.40**	**<.001**
Prior ED visit(s) for febrile seizure	1.14	.73	1.15	.54	**4.40**	**<.001**
Prior ED visit(s) for any reason§	**1.05**	**.08**	1.01	.70	**1.03**	**.18**
Seizure classification						
Not complex	Reference					
Complex	**24.39**	**<.001**	**15.58**	**<.001**	**6.08**	**<.001**
Focal features present	**18.57**	**<.001**	**8.15**	**<.001**	**2.84**	**.07**
Number of seizures over 24 h						
1	Reference					
2	0.83	.77	**5.07**	**<.001**	**4.05**	**<.001**
≥3	**5.73**	**<.001**	**12.32**	**<.001**	**6.31**	**<.001**
Duration of longest seizure						
≤1 min	Reference					
>1 min and ≤5 min	0.63	.39	0.80	.44	**2.61**	**.01**
>5 min and ≤15 min	1.61	.40	1.33	.39	**2.86**	**.01**
>15 min	**27.38**	**<.001**	**12.95**	**<.001**	**14.44**	**<.001**
Unknown	1.40	.64	**1.69**	**.18**	0.98	.98
Anticonvulsant administered at any point	**68.33**	**<.001**	**18.25**	**<.001**	**10.96**	**<.001**
Returned to baseline mental status in ED	**0.03**	**<.001**	**0.02**	**<.001**	0.83	.86
Personal history of febrile seizure	0.67	.28	0.80	.31	**6.77**	**<.001**
Family history of seizure	**0.59**	**.174**	0.78	.26	**1.89**	**.007**
Neurology consulted by ED	**8.02**	**<.001**	**6.97**	**<.001**	**13.32**	**<.001**
Antibiotics given in ED	**6.82**	**<.001**	**5.58**	**<.001**	0.65	.33
Any screening labs performed in ED‖	**17.60**	**<.001**	**11.42**	**<.001**	**2.39**	**<.001**

ED = emergency department, EMS = emergency medical services, OR = odds ratio.

*n = 980 encounters, except for the following covariates due to missing data: Insurance (n = 918), Ethnicity (n = 979), Means of Arrival to ED (n = 689), and Triage (n = 975).

†n = 871 encounters (only discharged patients), except for the following covariates due to missing data: Insurance (n = 818), Ethnicity (n = 870), and Means of Arrival to ED (n = 603).

‡OR per 1 month increase in age.

§OR per an increase of 1 prior ED visit for any reason.

‖Includes any of the following: complete blood count, serum electrolytes, calcium, magnesium, blood culture, liver function tests, c-reactive protein, erythrocyte sedimentation rate, urine toxicology screen, urinalysis, urine dipstick, and urine culture.

Medicaid insurance, less likely to be female or of Hispanic or Latino ethnicity, more likely to have had a previous ED visit for febrile seizure, and had a higher median number of previous ED visits for any reason. Clinical features were similar between groups, but black children were less likely to have received any type of screening laboratory study in the ED (Table 2), consistent with prior reports.[3,7–10] Overall, 39/980 (4.0%) children underwent neuroimaging and 109/980 (11.1%) were admitted to the hospital. Of the 871 children discharged home from the ED, 82 (9.4%) were prescribed an abortive anticonvulsant.

Table 2

Characteristics of ED visits for febrile seizure, stratified by patient race.

	Total (n = 980 ED visits)	Black (n = 589 ED visits)	Non-Black* (n = 391 ED visits)	*P*
Demographic features				
Age in mo, median (range)	20 (6–72)	22 (6–72)	20 (6–70)	.02†
Female sex (%)	406 (41.4)	220 (37.4)	186 (47.6)	.001‡
Medicaid insurance (%)	612 (62.5)	472 (80.1)	140 (35.8)	<.001‡
Hispanic or Latino ethnicity (%)	69 (7.0)	12 (2.0)	57 (14.6)	<.001‡
Preferred language English (%)	946 (96.5)	587 (99.7)	359 (91.8)	<.001‡
ED encounter characteristics				
Means of arrival to ED (%)				.001‡
Personal transportation	294 (30.0)	149 (25.3)	145 (37.1)	
EMS	360 (36.7)	234 (39.7)	126 (32.2)	
Other	35 (3.6)	25 (4.2)	10 (2.6)	
Triage (%)				.73‡
1-critical	22 (2.2)	13 (2.2)	9 (2.3)	
2-acute	505 (51.5)	295 (50.1)	210 (53.7)	
3-urgent	384 (39.2)	238 (40.4)	146 (37.3)	
4 & 5- semi- urgent/non-urgent	64 (6.5)	39 (6.6)	25 (6.4)	
Length of stay in h, median (IQR)	3 (2, 5)	3 (2, 5)	3 (2, 5)	.29†
First time ED visit for febrile seizure (%)	751 (76.6)	432 (73.3)	319 (81.6)	.003‡
Number of previous ED visits for any reason, median (IQR)	3 (1,7)	4 (2,9)	2 (0,4)	<.001†
Clinical history and characteristics				
Complex febrile seizure (%)	160 (16.3)	91 (15.5)	69 (17.7)	.36‡
Focal features noted (%)	34 (3.5)	22 (3.7)	12 (3.1)	.58‡
Number of seizures over 24 h (%)				.29‡
1	836 (85.3)	511 (86.8)	325 (83.1)	
2	103 (10.5)	56 (9.5)	47 (12.0)	
≥3	41 (4.2)	22 (3.7)	19 (4.9)	
Duration of longest seizure (%)				.19‡
≤1 min	225 (23.0)	129 (21.9)	96 (24.6)	
> 1 min and ≤5 min	473 (48.3)	274 (46.5)	199 (50.9)	
>5 min and ≤15 min	166 (16.9)	107 (18.2)	59 (15.1)	
>15 min	35 (3.6)	23 (3.9)	12 (3.1)	
Unknown	81 (8.3)	56 (9.5)	25 (6.4)	
Anticonvulsant administered at any point (%)	57 (5.8)	33 (5.6)	24 (6.1)	.73‡
Returned to baseline mental status in ED (%)	938 (95.7)	562 (95.4)	376 (96.2)	.57‡
Personal history of febrile seizure (%)	330 (33.7)	203 (34.5)	127 (32.5)	.52‡
Family history of seizure (%)	326 (33.3)	199 (33.8)	127 (32.5)	.67‡
Neurology consulted by ED (%)	166 (16.9)	89 (15.1)	77 (19.7)	.06‡
Antibiotics given in ED (%)	134 (13.7)	81 (13.8)	53 (13.6)	.93‡
Any screening labs performed in ED§ (%)	257 (26.2)	127 (21.6)	130 (33.3)	<.001‡
LP performed in ED (%)	22 (2.2)	15 (2.6)	7 (1.8)	.43‡
Primary and secondary outcomes (entire cohort)				
Neuroimaging performed in ED (%)	39 (4.0)	20 (3.4)	19 (4.9)	.25‡
Complex febrile seizure	31/39 (79.5)	16/20 (80.0)	15/19 (80.0)	>.99‡
Admitted to the hospital (%)	109 (11.1)	64 (10.9)	45 (11.5)	.75‡
Secondary outcome (discharged patients only)	Total (N = 871 ED visits)	Black (n = 525 ED visits)	Non-Black (n = 346 ED visits)	*P*
Abortive anticonvulsant prescribed (%)	82 (9.4)	35 (6.7)	47 (13.6)	.001‡

Totals for some variables may not add up to 100% due to missing data. ED = emergency department, EMS = emergency medical services, IQR = interquartile range.

*Non-Black cohort composed of 213 White, 70 Asian, 7 Indian, 1 American Indian/Alaska Native, 1 Hawaiian/Pacific Islander, 99 Other. The EMR did not have an option for separately coding patients identifying as multiple races.

†Wilcoxon rank-sum *P* value.

‡Chi-squared *P* value

§Includes any of the following: complete blood count, serum electrolytes, calcium, magnesium, blood culture, liver function tests, c-reactive protein, erythrocyte sedimentation rate, urine toxicology screen, urinalysis, urine dipstick, and urine culture.

3.1. Univariate analysis

There were no significant differences by race in the proportion of children who underwent neuroimaging on univariate analysis. On post hoc power analysis, using the neuroimaging prevalence observed of 4.9% in non-black children, our sample had 80% power to detect an absolute difference in neuroimaging prevalence by race of 3.2%. In examining secondary outcomes, there were no differences by race in hospital admission, but a significantly smaller proportion of black children received an anticonvulsant prescription at discharge compared to non-black children (6.7% vs 13.6%, $P = .001$) (Table 2). Findings from univariable logistic regression for the primary and secondary outcome variables are shown in Table 1.

3.2. Multivariate analysis

Findings from multivariate logistic regression models are shown in Figure 1 (see also Table, Supplementary Digital Content 2, http://links.lww.com/MD/H723, for full models). Race was not a significant predictor for the primary outcome of neuroimaging. Receipt of neuroimaging was instead largely driven by features of complex febrile seizures and need for an acute abortive anticonvulsant (Fig. 1A). In fact, 31/39 (79%) children that underwent neuroimaging had a diagnosis of complex febrile seizure. Race was also not a significant predictor for the secondary outcome of hospital admission (Fig. 1B). There were no interactions between race and insurance for either of these outcomes.

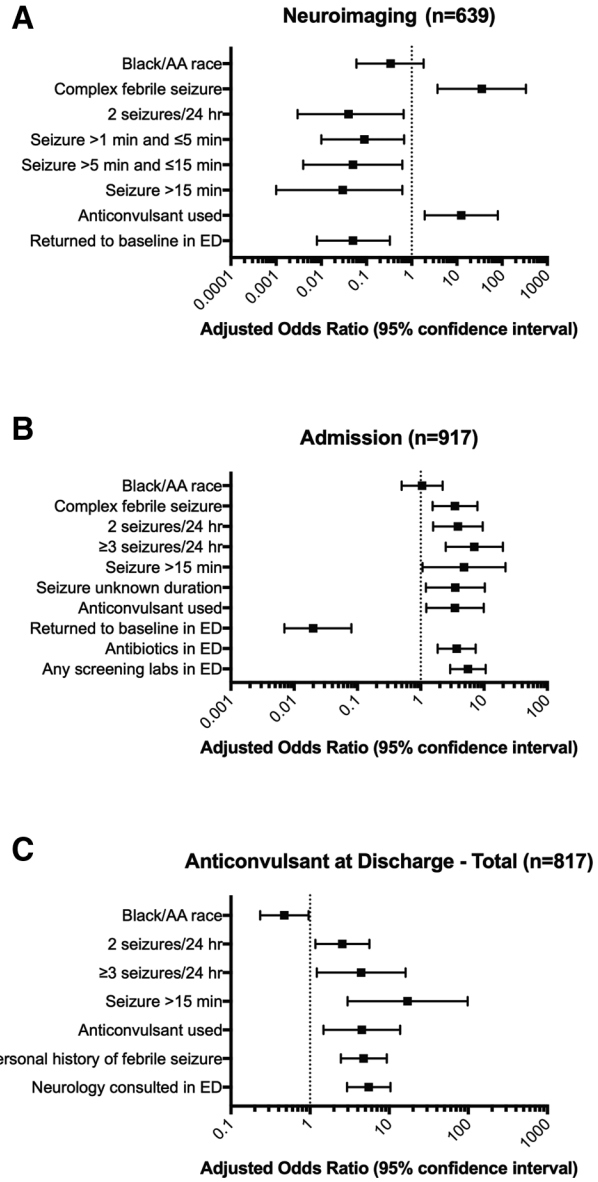

Figure 1. Multivariate logistic regression models describing the association of race and all statistically significant predictors with outcome variables of interest. See Table, Supplemental Digital Content 2, http://links.lww.com/MD/H723, for full models including pertinent confounding variables.

For the secondary outcome of anticonvulsant prescription, after adjusting for confounders, black children remained less likely to be prescribed anticonvulsants at discharge (adjusted odds ratio [aOR] 0.47, 95% confidence interval [CI]: 0.23–0.96, $P = .04$) compared to non-black children (Fig. 1C). Stratification by insurance type revealed a significant interaction between race and insurance for this secondary outcome, with black children less likely to be prescribed anticonvulsants at discharge compared to non-black children for patients with Medicaid insurance (aOR 0.33, 95% CI: 0.14–0.78, $P = .01$) but not for patients with private insurance (aOR 0.34, 95% CI: 0.05–2.50, $P = .29$) (Fig. 2).

3.3. Anticonvulsant prescription and ED revisits

Of the 871 ED visits that were discharged, 647 (74.3%) were for first-time febrile seizures, 36 (5.6%) of which were prescribed an abortive anticonvulsant at ED discharge. There was no difference in proportion of children who had an ED revisit later in the study time period between those that did and did not receive a prescription for abortive anticonvulsant at ED discharge after a first-time febrile seizure, either in the overall cohort (5/36 [13.9%] vs 94/611 [15.4%], $P = .81$), or in the local neighborhood cohort (1/7 [14.3%] vs 47/234 [20.1%], $P = .71$).

4. Discussion

In our analyses of all ED encounters for a febrile seizure diagnosis at a large, academic tertiary care children's hospital over a 4-year period, we found that there were no racial disparities in the proportion of children who underwent acute neuroimaging. For our secondary outcomes, we found no disparities in hospital admission; however, black children were less likely to receive a prescription for abortive anticonvulsants at discharge compared to non-black children. Furthermore, these racial disparities in anticonvulsant prescription were seen in patients with Medicaid but not in those with private insurance.

Our finding of no disparities in neuroimaging contrasts with prior findings. For example, 1 study of patients of all ages presenting to the ED for febrile and afebrile seizure, found that black patients were significantly less likely to receive neuroimaging compared to white patients, though these findings were from a national billing database that was unable to examine febrile seizures specifically, and prevalence of neuroimaging was strongly driven by older age.[21] Several other studies specifically in the pediatric ED setting have also shown nonwhite children to be less likely to receive radiological testing in the ED for a variety of presenting complaints compared to their white counterparts.[7,8,10] While our study may have been underpowered to detect a difference with the existing sample size given overall low prevalence of neuroimaging, the lack of obvious disparities here, taken in conjunction with the overall pattern of findings, may help provide insight into why certain aspects of care may be more or less vulnerable to disparities than others, and how we may systematically mitigate these disparities in the larger healthcare setting.

One suggested method to reduce racial disparities is to generate practice guidelines to guide consistent provider decision-making and decrease the effect of implicit bias on care delivered.[10] The AAP published updated clinical practice guidelines on the management of simple febrile seizures in 2011, specifically advising providers to avoid performing neuroimaging and instead focus on identifying the cause of fever.[15] Our study's overall low proportion of children who underwent neuroimaging (4.0%) suggests that providers are likely adhering to these guidelines, which may explain the absence of racial disparities in this outcome. Furthermore, in thinking of our secondary outcome of hospital admission, although the AAP guidelines do not comment explicitly on disposition for febrile seizures, they advise against further routine evaluation.[15] Admission is therefore likely determined by ongoing clinical considerations such as return to baseline mental status after seizure and fever etiology, in addition to caregiver comfort level. The inclusion of objective clinical factors when deciding disposition may also explain the lack of racial disparities in the proportion of children admitted to our institution.

Unlike the outcomes above that have evidence- or consensus-based recommendations regarding their utility, there are no clear guidelines to help providers determine if or when prescribing abortive anticonvulsants is warranted, and what impact this has on future ED revisits for recurrent febrile seizures.[26,27] In fact, 2 febrile seizure review articles have expressly referenced the lack of evidence-based guidelines for abortive anticonvulsant prescription.[28,29] Because we do not expect there to be biological differences in recurrence rate or severity of febrile seizure between races, our secondary finding that black

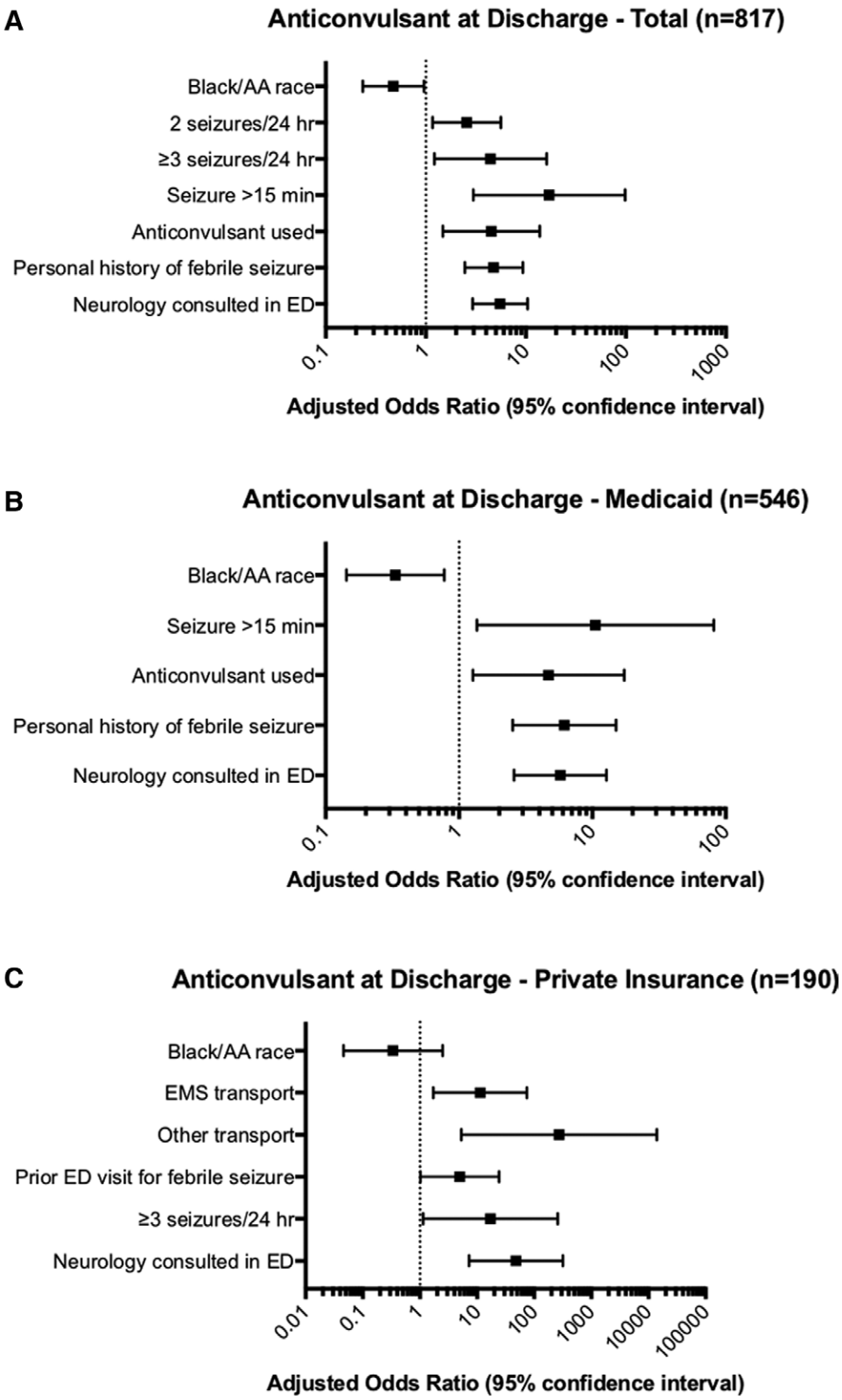

Figure 2. Multivariate logistic regression models describing the association of race and other statistically significant predictors of abortive anticonvulsant prescription for (A) all discharged patients, (B) discharged patients with Medicaid, and (C) discharged patients with private insurance. See Table, Supplemental Digital Content 2, http://links.lww.com/MD/H723, for full models, including pertinent confounding variables.

children were less likely than their non-black peers to receive an anticonvulsant prescription at ED discharge may reflect an implicit bias surfacing in the absence of organized practice guidance. Interestingly, we found no significant difference in the proportion of children who returned for a subsequent ED visit due to febrile seizures between those who were or were not prescribed an abortive anticonvulsant after their first febrile seizure, suggesting that anticonvulsant prescription has little impact on

future ED utilization. Given that abortive anticonvulsants can have side effects, particularly sedation, further investigation into the role of abortive anticonvulsant therapy in febrile seizures is needed, well as more targeted study of possible disparities in their prescription.

Our study also demonstrated the presence of effect modification by insurance status for one of our secondary outcomes, with racial disparities in anticonvulsant prescription for patients with Medicaid insurance but not in children with private insurance. The most common abortive anticonvulsant prescription used in our cohort was rectal diazepam, which costs about $400 out of pocket in our region; however, abortive anticonvulsants are included in the Preferred Drug List for both Pennsylvania and New Jersey Medicaid with no prior authorization requirement,[30,31] so it is unlikely that these differences are specifically due to providers' concerns regarding insurance coverage. However, insurance status may serve as a proxy for other socioeconomic features, such as household income and/or parental health literacy,[32] which could influence how providers interact with caregivers and vice versa. For example, caregivers of children with private insurance may have higher health literacy and advocate for anticonvulsant prescriptions such that providers provide prescriptions equally across race. Implicit bias regarding perceived health literacy and race on the part of the provider may also contribute to this finding. Future prospective and/or qualitative studies of the caregiver-provider interaction could elucidate the role of insurance type in racial disparities in anticonvulsant prescription.

There are several potential limitations to this study. First, our data were collected from a single medical center that serves as a tertiary referral center, which may limit the generalizability of our findings. However, we had a large sample size and purposefully excluded patients who were previously seen at other hospitals, so we believe that our data are representative of many large, urban, pediatric EDs. Our analysis of abortive anticonvulsant prescription and ED revisit rates is also limited by the single center nature, as we cannot capture patients who may have presented to other hospitals for subsequent febrile seizures. However, our findings remained after restricting our sample to patients living at zip codes with high referral rates to our institution. Second, our data consisted of self-reported race, which is considered the gold standard for assessing these demographic features.[33] Since our study asks how ED management differs by race, providers' perception of race may be more pertinent; however, these data were not available retrospectively. Third, our data were obtained retrospectively from the EMR. It is possible that some patients were miscoded, particularly in terms of febrile seizure classification, which could lead to misclassification bias. We endeavored to mitigate this risk by collecting several variables to capture the clinical features of the seizure, all of which were included in analysis models, along with febrile seizure classification. Fourth, we did not collect data on ED providers, although differences in provider-specific practices and experience levels may have influenced management decisions. However, over fifty attending providers staff our ED along with numerous trainees, suggesting that there may be enough overall variability to diminish the effects of individual providers. Finally, the retrospective study design does not allow us to account for all the possible social determinants that may play a role, or to test potential mechanisms for the pattern of racial disparities found in our study. Future studies using a prospective design or qualitative methodology to examine the family–provider interaction or understand the provider's thought process in management decisions could provide valuable insight into how racial disparities are created.

In conclusion, febrile seizure is a common diagnosis made in the pediatric ED. Multivariate analysis controlling for a wide array of demographic, ED encounter, and clinical features demonstrated that there were no racial disparities in the proportion of children who underwent acute neuroimaging, or our secondary outcome of hospital admission. However, we did find a racial disparity in our secondary outcome of anticonvulsant prescription at discharge in patients insured through Medicaid, a finding that merits further investigation to elucidate possible mechanisms, such as differential parental health literacy, that may contribute to healthcare disparities. The lack of disparities in neuroimaging and hospital admission may reflect the clearer evidence-based or consensus-based recommendations issued for these management decisions, and suggests that standardized treatment guidelines may be one mechanism to reduce overall healthcare disparities.

Author contributions

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