Racial Disparities in Hospitalization Due to Ambulatory Care Sensitive Conditions Among U.S. Children with Autism

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Abstract

Purpose This study was to investigate the factors associated with preventable hospitalization due to ambulatory care sensitive conditions (ACSCs) in children with autism.

Methods Using secondary data from the U.S. Nationwide Inpatient Sample (NIS), multivariable regression analyses were conducted to determine the potential effect of race and income level on the likelihood of inpatient stays for ACSCs among autistic children. Pediatric ACSCs included three acute conditions (dehydration, gastroenteritis, and urinary infection) and three chronic conditions (asthma, constipation, and diabetes short-term complications).

Results In this analysis, there were 21,733 hospitalizations among children with autism; about 10% were hospitalized due to pediatric ACSCs. Overall, the odds of ACSCs hospitalization were greater among Hispanic and Black autistic children versus White autistic children. Both Hispanic and Black autistic children from the lowest income level had the highest odds to be hospitalized for chronic ACSCs.

Conclusion Inequities of access to health care among racial/ethnic minorities were most notable for autistic children with chronic ACSC conditions.

Keywords Ambulatory care sensitive conditions (ACSCs) · Autism · Hospitalizations · Household income levels · Race/ethnicity

Introduction

Ambulatory care sensitive conditions (ACSCs) are a set of acute and chronic medical conditions that are considered treatable in primary health care settings (Billings et al., 1996; Garg et al., 2003). Preventable hospitalization due to ACSCs has been used to indicate whether patients are receiving adequate and quality ambulatory care (Coller et al., 2018). Therefore, hospitalization for ACSCs can be an indirect indicator of the accessibility and quality of primary health care and can also index variability in integrated health services delivery (Ricketts et al., 2001). Moreover, ACSCs-related hospitalizations can be used to study the comparative health systems (Rocha et al., 2021). While ACSCs indicators are based on hospital inpatient data, they provide insight into the quality of the health care system outside the hospital setting. Previous studies have shown that higher likelihood of ACSCs-related hospitalization is associated with less access to primary health care (Bindman et al., 1995; Gill et al., 1998; Laditka et al., 2005). Research also suggests that individuals with autism are more likely to be hospitalized for ACSCs than the general population (Carbone et al., 2015; Hand et al., 2019).

Children with autism require a high degree of health care, with associated financial burdens to their families and to health care systems (Buescher et al., 2014; Cidav et al., 2013; Lavelle et al., 2014). Families of children with autism are more likely to report unmet health care needs relative to families of children with other disabilities (Benevides et al., 2016). The Centers for Disease Control estimated that 23 per 1,000 eight-year-olds have been identified with autism (Maenner et al., 2021). The increasing prevalence of

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autism affects every race, ethnicity, and socioeconomic status. Children with autism were more likely to utilize health care services compared to children without autism (Gurney et al., 2006; Iannuzzi et al., 2015), while families of children with autism with lower socio-economic status have limited access to primary care services (Levy et al., 2010; Nayfack et al., 2014). Moreover, families that include children with ACSCs face unique challenges in managing their condition; the comorbidity of autism can further complicate the management of their condition and increase the risk for hospitalization.

Racial inequities are pervasive in the U.S. health care system (Mateo & Williams, 2021). The lack of access to quality health care among racially minoritized families remains a serious issue. Racial disparities in autism exist even when accounting for differences in socioeconomic status (Dickerson et al., 2017; Durkin et al., 2017; Emerson et al., 2016). Children from racial and ethnic minoritized groups with autism face greater barriers in access to healthcare (Magaña et al., 2012; Parish et al., 2012). Non-Hispanic Black, Hispanic, and low-resourced children with autism have worse healthcare access than non-Hispanic White children with autism and are less likely to use specialty healthcare services (Broder-Fingert et al., 2013; Liptak et al., 2008). Black children are also less likely to receive family-centered care overall (Magnusson & Mistry, 2017). While some progress has been made in the identification of autism in diverse racial and ethnic populations (Yuan et al., 2021), caregivers of Black and Hispanic children have reported negative experiences in health care settings such as feeling unheard with dismissal of their concerns and ongoing experiences of racism (Zuckerman et al., 2021; Pearson & Meadan, 2018). Research examining racial disparities in ACSCs-related hospitalization is timely and critical. Such research underscores the need to develop public policy, clinical practice and behavioral interventions that can address barriers to accessing quality primary care services for underserved children with autism.

Little is known about associations between race and ethnicity and preventable hospitalization of ACSCs in children with autism. Several studies demonstrated that a patient's race/ethnicity is a significant predictor of ACSCs hospitalization among adult populations (Doshi et al., 2020; O'Neil et al., 2010). A previous study reported that Black children were nearly two times more likely than White children to be hospitalized for ACSCs (Shi & Lu, 2000); and only one study compared ACSCs hospital admission between children with and without autism (Carbone et al., 2015). However, this study used a single year dataset and did not examine racial/ethnic differences in ACSCs hospitalization.

Using secondary data from the U.S. Nationwide Inpatient Sample (NIS), we conducted multivariable regression analyses to determine the potential effect of race and income level on the likelihood of inpatient stays for ACSCs among autistic children after controlling demographic and clinical characteristics. We conducted a cross-sectional analysis of the NIS involving child inpatients 2–17 years, using three years of data from the 2017 and 2019 NIS. Further, this study examined the factors associated with ACSCs admissions for children with autism in each of the income cohorts respectively and analyzed the differences in characteristics across income cohorts. The following research questions were posed: (1) Do hospitalization patterns vary by racial and income groups for autistic children admitted for ACSCs? (2) What significant factors are associated with the likelihood of ACSCs hospitalizations for autistic children in multivariable analyses? (3) Do hospitalization characteristics differ across income cohorts for autistic children hospitalized for ACSCs?

Methods

Data Sources

This analysis was performed on multi-year datasets from the NIS. The NIS is a component of the Healthcare Cost and Utilization Project (HCUP) funded by the Agency for Healthcare Research and Quality (AHRQ). The NIS was created to enable analyses of inpatient care utilization, access, charges and outcomes. It offers information on diagnoses, procedures, and patient demographics, and it also contains clinical information such as hospital length of stay and disposition. The NIS is currently the largest publicly available all-payer hospital inpatient care database in the U.S.; its large sample size enables analyses of special patient populations with common and rare conditions, and hospital and discharge weights are available to calculate national estimates. The primary and secondary diagnoses were coded in ICD-10-CM (International Classification of Diseases, Tenth Revision, Clinical Modification) in the NIS, and they were used to identify ACSCs and autism in this study. We used three-year aggregated data to compare ACSCs hospitalization by racial and income groups for specific types of ACSCs (e.g., asthma, dehydration), with years pooled to improve the precision of estimates and to enable comparisons across racial and income subgroups. The NIS datasets have 15 diagnosis fields: one principal diagnosis and up to 14 secondary diagnoses. In this analysis, our study sample included pediatric inpatients ages 2 to 17 years with any secondary autism diagnoses. For example, a hospital discharge record was coded as autism-related if the first diagnosis (i.e., primary diagnosis) was asthma, the second diagnosis was pneumonia, and the third diagnosis was

autism. The age 2 cutoff was used to improve the reliability of the child's autism diagnosis.

Study Measures

Pediatric ACSCs were selected based on a comprehensive review of previous studies of pediatric ACSCs in the U.S. and UK (Billings et al., 1993; Carbone et al., 2015; Lu & Kuo, 2012; Parker & Schoendorf, 2000; Purdy et al., 2009; Steiner et al., 2003; Tom et al., 2013). After a preliminary assessment of the feasibility of data, ACSCs used in this study included three acute conditions (dehydration, gastroenteritis, and urinary infection) and three chronic conditions (asthma, constipation, and diabetes short-term complications). Appendix 1 lists ACSCs diagnosis and corresponding ICD-10-CM codes. We considered hospitalizations as ACSCs if any of these six conditions appear in the primary diagnosis category of the hospitalization record. Our merged datasets had 2,232 ACSC hospitalizations among children with autism during 2017–2019, including asthma (n = 673), constipation (n = 454), diabetes short-term complications (n = 222), dehydration (n = 476), gastroenteritis (n = 281), and urinary infection (n = 126).

Race/ethnicity was categorized into four categories: non-Hispanic Black, non-Hispanic White, Hispanic, and non-Hispanic other race (patients who self-reported as Asian, Pacific Islander, Alaska Native or Native American, and non-Hispanic). Income level was a quartile classification of the estimated median household income of residents in the patient's ZIP Code (0-25th percentile, 26th -50th percentile, 51th -75th percentile, and 76th -100th percentile). The following patient characteristics were also included as study variables in this analysis: age, sex, principal insurance payer (public, private, uninsured) and resident location (rural and urban). Clinical measures included patient disposition at the time of discharge (routine vs. others) and hospital length of stay.

Data Analysis

We compared ACSC hospitalizations by race/ethnicity groups and income levels using Chi square tests. We then performed multivariable regression analyses to determine the potential effect of race and income levels on ACSC hospitalizations after controlling for patient and clinical characteristics. The dependent variable was dichotomous, with patients discharged for any of the acute or chronic ACSC conditions listed above coded as 1 and others coded as 0. The independent variable was race/ethnicity groups. The control variables used in the regression models included age, sex, quartile for median household income, insurance payer types, disposition type at hospital discharge and hospital length of stay. We also conducted a sub-group analysis by household income levels, using the same statistical methods. All analyses were performed using SAS version 9.4 (SAS Institute, Inc., Cary, NC). Odds ratios (OR) were used as a measure of association and 95% confidence intervals (CI) were computed. All p values were 2-sided, and $p < .05$ was deemed statistically significant.

Results

A total of 21,733 hospitalizations for children ages 2 to 17 were associated with an autism diagnosis during 2017 to 2019. Among them, 10.3% (n = 2,232) were hospitalized due to pediatric ACSCs (4.1% for acute ACSCs and 6.2% for chronic ACSCs). Each individual ACSC ranged from 0.6% for urinary infection to 3.1% for asthma among autistic children. Figure 1 provides a visual representation of ACSC hospitalizations by racial group among autistic children. Table 1 presents descriptive statistics of hospitalization characteristics by chronic and acute ACSCs. Among racial groups, Black autistic children had highest proportion of chronic ACSCs (10.2%) and Hispanic autistic children had highest proportion of acute ACSCs (5.5%). Among income groups, 12.5% of autistic children from families with the lowest income level (0-25th percentile) were hospitalized for ACSCs compared to 8.7% from families with the highest income levels (76th -100th percentile). Among age groups, children ages 2–5 years had highest proportion of hospitalization due to ACSCs (19.5%), while this proportion was only 4.8% for children ages 13–17 years. There were no significant differences among sex groups for ACSCs overall. However, female autistic children had a higher proportion of acute ACSCs than male (4.74 vs. 3.83%, $p < .05$), while male autistic children had a higher proportion of chronic ACSCs than female (6.52 vs. 5.28%, $p < .001$). Although there were no differences between rural-urban residents in general, the proportion of asthma hospitalizations was significantly higher in urban areas than rural areas (3.28 vs. 1.76%, $p < .001$).

Multivariable Regression Results

Table 2 presents adjusted results from the multivariable logistic regression analysis. Overall, the likelihood of ACSCs hospitalization was greater among Hispanic and Black autistic children versus White autistic children ([OR = 1.14, 95% CI (1.00, 1.29)]; [OR = 1.34, 95% CI (1.18, 1.53)]). The adjusted results indicate that lower levels of median household income were associated with higher likelihood of ACSCs hospitalization among children with autism, notably for children from the lowest income level

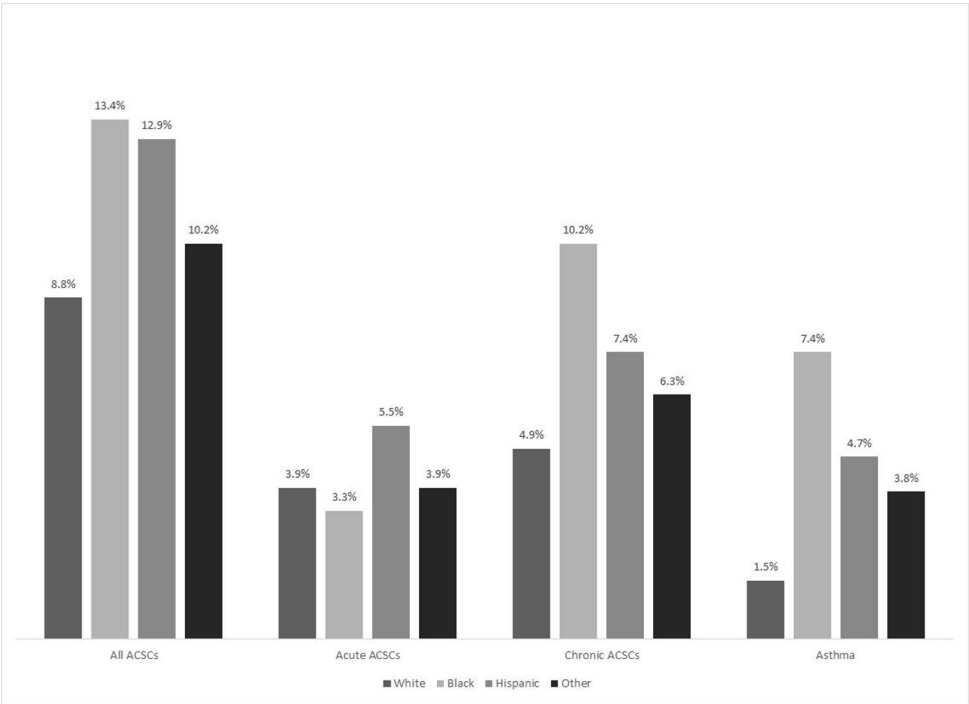

Fig. 1 Percent (%) of ACSCs hospitalization by racial group among children with autism. All ACSCs, n = 2,232 (Weighted N = 11,160), acute ACSCs, n = 883 (Weighted N = 4,415), chronic ACSCs, n = 1,349 (Weighted N = 6,745), asthma, n = 673 (Weighted N = 3,365)

(< = 25th percentile vs. >=75th percentile) [OR = 1.38, 95% CI (1.19, 1.60)]). Autistic children from the families at the lower income levels (< 50th percentile) were 1.4–1.6 times more likely to be hospitalized for chronic ACSCs compared to those from the highest income level (> = 75th percentile). Autistic children younger than 6 years had significantly higher odds of being hospitalized for ACSCs than autistic children ages 6 years and older. Consistent with the results of univariate analysis reported above, female vs. male autistic children had higher odds of being hospitalized for acute ACSCs [OR = 1.32, 95% CI (1.13, 1.54)], while female vs. male autistic children had lower odds to be hospitalized for chronic ACSCs [OR = 0.82, 95% CI (0.71, 0.94)]. The adjusted results also show that publicly insured autistic children were more likely to be hospitalized for ACSCs than their privately insured counterparts [OR = 1.13, 95% CI (1.02, 1.26)].

The adjusted regression results did not show statistically significant differences for five individual ACSCs among race and income groups except for asthma. Asthma was the most frequent ACSC condition among autistic children. Notably, Black autistic children were nearly four times more likely to be hospitalized for asthma compared to their white counterparts [OR = 3.78, 95% CI (3.06, 4.67)], while Hispanic autistic children were two times more likely to be hospitalized for asthma than White autistic children [OR = 2.01, 95% CI (1.61, 2.51)]. However, Autistic children residing in rural vs. urban areas were less likely to be hospitalized for asthma [OR = 0.66, 95% CI (0.47, 0.92)].

Multivariable Regression Results by Income Cohort

Stratified regression analysis was conducted by the four income groups. The results showed the effects of racial groups and other characteristics on ACSCs hospitalization stratified by income levels. Across all four-income cohorts, young children ages 2–5 years had significantly higher odds of being hospitalized for ACSCs compared to children ages 6–17. Furthermore, stratified analysis by income levels showed that both Hispanic and Black autistic children from the lowest family income level (0-25th percentile) had significantly higher odds of being hospitalized for chronic ACSCs than White autistic children at this family income level, while no significant differences were found between race and ACSCs hospitalization among children from the higher family income levels (above 50th percentile). Notably, Black autistic children (vs. White autistic children) had significantly higher odds of being hospitalized for asthma across all four income levels. However, racial differences in ACSCs hospitalizations were more heterogeneous across income levels for acute ACSCs. Black autistic children (vs. White autistic children) from the lowest family income level (0-25th percentile) had significantly lower odds of being hospitalized for acute ACSCs, while Hispanic autistic children (vs. White autistic children) from the income level 3 had significantly higher odds of being hospitalized for acute ACSCs. Table 3 presents the multivariable analysis results for children from families at median household income less than 26th percentile.

Table 1 Characteristics of ACSCs hospitalization among children with autism

Characteristics	All ACSCs (n = 2,232) Weighted_N 11,160	Acute ACSCs (n = 883) Weighted_N 4,415	Chronic ACSCs (n = 1,349) Weighted_N 6,745
	N (%)	N (%)	N (%)
Age	***	***	***
2–5 years	754 (19.5)	351 (9.1)	403 (10.4)
6–12 years	1,085 (11.3)	391 (4.1)	694 (7.2)
13–17 years	393 (4.8)	141 (1.7)	252 (3.1)
Sex		*	**
Male	1,678 (10.4)	621 (3.8)	1,057 (6.5)
Female	554 (10.0)	262 (4.7)	292 (5.3)
Race	***	***	***
non-Hispanic White	1,076 (8.8)	479 (3.9)	597 (4.9)
non-Hispanic Black	399 (13.4)	97 (3.3)	302 (10.2)
Hispanic	464 (12.9)	198 (5.5)	266 (7.4)
Other	188 (10.2)	72 (3.9)	116 (6.3)
Income level	***		***
0-25th percentile	720 (12.5)	256 (4.5)	464 (8.1)
26th -50th percentile	545 (9.9)	199 (3.6)	346 (6.3)
51th -75th percentile	525 (9.7)	222 (4.1)	303 (5.6)
76th -100th percentile	417 (8.7)	197 (4.1)	220 (4.6)
Principal insurance payer	***		***
Public	1,481 (11.4)	556 (4.3)	925 (7.1)
Private	719 (8.6)	319 (3.8)	400 (4.8)
Uninsured	30 (10.2)	8 (2.7)	22 (7.5)
Resident location	*		
Rural	226 (8.8)	88 (3.4)	138 (5.4)
Urban	2,004 (10.5)	795 (4.2)	1,209 (6.3)
Discharge status	***	***	***
Routine	2,152 (10.7)	845 (4.2)	1,307 (6.5)
Others	79 (5.0)	37 (2.4)	42 (2.7)
Hospital Length of Stay			
mean (SE)	2.6 (3.0)	2.7(2.7)	2.5(3.2)

*p < .05; **p < .001;***p < .0001

Discussion

These results highlight the existing racial/ethnic and income disparities in preventable hospitalization due to ACSCs among underserved children with autism. Racial minority and children from low-income families have poorer primary care experiences and have higher risk of potentially avoidable hospitalizations for ACSCs. Inequities of access to health care among racial/ethnic minorities were most notable for autistic children with chronic preventable conditions. Specifically, the burden of asthma hospitalization falls disproportionally on Black autistic children.

It is notable that Black autistic children are at substantially higher risk of asthma hospitalization than are White autistic children across all four income levels. A recent large study found that Black and Hispanic children had consistently higher rates of asthma than White children did even in more affluent neighborhoods (Zanobetti et al., 2022). The researchers suggest that structural racism associated with the inequities in social and environmental factors may broadly influence respiratory health. Our results further suggest that Black autistic children with asthma need high-quality primary care management, regardless of family income levels.

Unmet primary care needs may lead to potentially avoidable hospitalizations for ACSCs, potentially increasing stress for families of children with autism. The well-established partnership between families and physicians to deliver primary health care is vital. The Autism Speaks Autism Treatment Network recommended an interdisciplinary approach to reduce the number of appointments autistic children may need to attend while maximizing the expertise by infusing the clinical team with varying professional views (Nationwide Children's Hospital, 2021). Changes in pediatric care in primary care settings, such as providing autistic children ample time per visit, are indicated to better address these preventable hospitalizations. This recommendation would require substantial changes in medical billing and coding

Table 2 Multivariable regression results of ACSCs hospitalization

Characteristics	All ACSCs	Acute ACSCs	Chronic ACSCs	Asthma
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Age				
6–12 vs. 2–5	0.62(0.56, 0.69)*** 0.079	0.48(0.41, 0.56)*** 0.079	0.82(0.72, 0.94)* 0.079	0.54(0.45, 0.64)*** 0.079
13–17 vs. 2–5	0.28(0.24, 0.32)*** 0.011	0.21(0.17, 0.27)*** 0.011	0.39(0.33, 0.47)*** 0.011	0.13(0.09, 0.18)*** 0.011
Sex				
Female vs. male	1.01(0.90, 1.12) 0.920	1.32(1.13, 1.54)** 0.920	0.82(0.71, 0.94)* 0.920	0.66(0.53, 0.81)** 0.920
Race				
Hispanic vs. white	1.14(1.00, 1.29)*	1.11(0.93, 1.33)	1.14(0.97, 1.33)	2.01(1.61, 2.51)***
Black vs. white	1.34(1.18, 1.53)*** 0.073	0.71(0.56, 0.90)* 0.073	1.82(1.57, 2.12)*** 0.073	3.78(3.06, 4.67)*** 0.073
Others vs. white	0.92(0.77, 1.09) 0.372	0.76(0.59, 0.99)* 0.990.990.90)0.372	1.06(0.86, 1.32) 0.372	1.82(2.36, 1.44)*** 0.372
Income level				
0-25th vs. >75th	1.38(1.19, 1.60)***	1.11(0.89, 1.38)	1.57(1.30, 1.89)***	1.88(1.46, 2.44)***
26th -50th vs. >75th	1.15(0.99, 1.34) 0.073	0.87(0.70, 1.09) 0.073	1.39(1.15, 1.68)** 0.073	1.25(0.95, 1.65) 0.073
51th -75th vs. >75th	1.11(0.96, 1.29) 0.372	1.00(0.81, 1.23) 0.372	1.21(0.99, 1.46) 0.372	1.08(0.81, 1.44) 0.372
Principal insurance				
Public vs. private	1.13(1.02, 1.26)*	1.03(0.88, 1.21)	1.19(1.04, 1.37)*	1.18(0.97, 1.44)
Resident location				
Rural vs. urban	0.86(0.73, 1.02)	0.85(0.66, 1.09)	0.89(0.73, 1.09)	0.66(0.47, 0.92)*
Discharge status				
Routine vs. others	1.45(1.14, 1.84)* 0.079	1.14(0.81, 1.60) 0.079	1.69(1.23, 2.32)* 0.079	1.71(1.04, 2.82)* 0.079
Hospital length of stay	0.85(0.83, 0.88)*** 0.011	0.89(0.86, 0.92)*** 0.011	0.84(0.80, 0.87)*** 0.011	0.77(0.71, 0.84)*** 0.011

*p < .05; **p < .001;***p < .0001

conventions. National medical organizations could play an influential role by advocating for such changes.

Our study findings further suggest that policies designed to reduce preventable hospitalization due to ACSCs should target selected low-income communities with a higher proportion of racial and ethnic minorities. It is vital to eliminate any discriminatory practices in access to care for racial and ethnic minority children with disabilities. Furthermore, access to services among underserved populations can vary considerably across communities. A study suggests that free clinics in North Carolina have been effective in reducing hospitalizations for chronic ACSCs for uninsured adults (Hutchison et al., 2018). Policy makers need to understand broad socioeconomic and cultural issues in a community related to preventable hospitalizations, and assess the effectiveness of the health care safety net in order to meet the needs of the population served.

Our findings from this analysis also make a contribution to the development of future measures for comprehensive analyses of access to care among racial/ethnic groups while considering ACSCs in different international contexts. Different research groups studying the various components of health systems internationally may lead to an aggregate picture that improves understanding the health services delivery systems. While the selection of ACSCs-related hospitalizations is an important dimension of health system performance, researchers also need to be aware of methodological and diagnostic differences in making inter-country comparisons (Hossain et al., 2017). Comparing hospitalizations for ACSCs across different health systems can be valuable, as it can shed light on potential benefits and drawbacks of the health policy design and provide inspiration for how to reform health delivery systems that will increase access and control costs.

The use of datasets of a large, multiyear inpatient sample is a significant strength of this study. However, this study has some limitations. The unit of analysis of this study is an inpatient stay record. Individual patients could be represented multiple times in the datasets because the NIS contains discharge-level records rather than patient-level data. This analysis cannot exclude these individual patients, and population estimates presented in this study might be inflated by the inclusion of these individuals multiple times. The NIS lacks information on primary care, urgent care, and other pre-admission health services and these services likely play a role in hospital use. Furthermore, the NIS is derived from hospital billing data; the administrative datasets are subject to limitations such as misclassification and inadequate information. Medical billing and coding for ACSCs can vary by hospitals. It is also possible that the diagnosis of autism spectrum may have been underreported in an inpatient dataset. For example, this might occur because the child has not yet been diagnosed with autism, has been diagnosed in the past but no longer displays relevant symptoms, or because the symptoms are not relevant to the primary reason of the inpatient hospitalization. Finally, we acknowledge that the use of other diagnostic classifications may have yielded a different sample composition. For example, the classification for autism in the DSM-5 varies slightly from the ICD-10-CM (Doernberg & Hollander, 2016). Therefore, our research results regarding health insurance coverage and health services utilization among autistic children would likely also be impacted by applying the DSM-5 criteria.

Conclusion

Disparities in autism and inequities of access to health care among racial/ethnic groups persist. Some hospitalizations may be avoided through better primary care and chronic disease management such as improving parent and provider communication for adherence to asthma medications. Clinical and social programs, policies and interventions need to be aimed at ensuring the availability of and accessibility to quality primary care for low-income Hispanic and Black children with autism and mitigating health inequities associated with potentially avoidable hospitalizations.

Table 3 Multivariable regression results of ACSCs hospitalization for children from families at the lowest median household income category

0-25th income level	All ACSCs	Acute ACSCs	Chronic ACSCs	Asthma
Characteristics	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Age				
6–12 vs. 2–5	0.61(0.51, 0.74)*** 0.079	0.16(0.10, 0.25)*** 0.079	0.78(0.62, 0.98)* 0.079	0.12(0.07, 0.20)** 0.079
13–17 vs. 2–5	0.24(0.19, 0.31)***)* 0.011	0.61(0.51, 0.74)*** 0.011	0.35(0.26, 0.48)***)* 0.011	0.35(0.26, 0.48)***)0.011
Sex				
Female vs. male	1.05(0.87, 1.28) 0.920	1.53(1.15, 2.02)* 0.920	0.81(0.63, 1.03) 0.920	0.70(0.51, 0.98)* 0.920
Race				
Hispanic vs. white	1.35(1.08, 1.68)*	1.12(0.81, 1.55)	1.48(1.12, 1.95)*	2.96(2.00, 4.37)***
Black vs. white	1.67(1.35, 2.06)*** 0.073	0.25(0.35, 0.78)*** 0.073	2.70(2.10, 3.47)*** 0.073	5.83(4.04, 8.40)*** 0.073
Others vs. white	1.29(0.93, 1.79) 0.372	1.12(0.70, 1.79) 0.372	1.37(0.91, 2.07) 0.372	1.95(1.10, 3.45)*
Principal insurance				
Public vs. private	0.95(0.77, 1.16)	0.92(0.67, 1.26)	0.97(0.76, 1.25)	1.02(0.73, 1.42)
Resident location				
Rural vs. urban	0.89(0.71, 1.11)	0.89(0.63, 1.26)	0.89(0.67, 1.19)	0.82(0.55, 1.24)
Discharge status				
Routine vs. others	1.39(0.91, 2.12) 0.079	1.22(0.63, 2.34) 0.079	1.47(0.87, 2.48) 0.079	1.61(0.76, 3.39)
Hospital length of stay	0.86(0.81, 0.90)*** 0.011	0.90(0.85, 0.96)** *0.011	0.83(0.77, 0.90)*** 0.011	0.74(0.67, 0.81)*** 0.011

*p < .05; **p < .001;***p < .0001

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s10803-023-05995-8.

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