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Factors associated with emergency department visits for asthma resulting in hospital admission— United States, 2020

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Abstract

Objective—To identify risk factors associated with hospital admission following an ED visit for asthma at the time of discharge among U.S. children and adults.

Methods—Asthma emergency department visits resulting in hospital admissions using discharge data among children (aged 0–17 years) and adults (aged 18 years or older) from the 2020 Nationwide Emergency Department Sample (NEDS), Healthcare Cost and Utilization Project (HCUP), Agency for Healthcare Research and Quality were examined. Risk factors associated with hospital admission following ED visits were identified using univariable and multi-variable logistic regression models.

Results—Among children, hospital admission after asthma-related ED visits was higher for females, ages less than 12 years, and discharged in January–March or in October–December and lower for Black children, Hispanic children, Medicaid or Medicare beneficiaries, other/no charge/self-pay, and in metropolitan non-teaching or non-metropolitan hospitals. Among adults, asthma ED visits resulting in hospital admissions were higher for females, ages 35 years or older, discharged in January–March, and for Medicare beneficiaries and lower for Black adults, Hispanic adults, adults of other races, other/no charge/self-pay, in metropolitan non-teaching or non-metropolitan hospitals, and median household income quartiles for patient's ZIP Code of less than $59,000 were lower.

Conclusions—Sociodemographic factors, healthcare use, and household income were significantly associated with hospital admissions at the time of discharge from the ED. Examining hospital admission after an ED visit for asthma is important in identifying these groups and better addressing their healthcare needs.

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Disclaimer

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

Declaration of interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this article.

Keywords

Healthcare use; respiratory diseases; disparities; children; adults

Introduction

Persons with asthma who might be unaware of asthma triggers, and do not recognize worsening asthma symptoms for early interventions, may experience acute asthma exacerbations requiring the patient to seek immediate care at the emergency department.[1] Also, uninsured and underinsured patients are less likely to have a primary care physician or primary care home.[2] Among these patients, the ED may be the only source for their asthma care.[3] In 2022, about 4.0% of U.S. children (including children with asthma) under age 18 years and 12.0% of U.S. adults aged 18–64 years were uninsured at the time of interview.[4]

The disposition of patients who are discharged from the ED, depends on the patients' specific medical condition(s) and needs. In 2020, the majority of ED visits (78%) were treated and released (i.e., routine discharge), but others had different dispositions. Specifically, some ED visits resulted in hospital admission (16%), and some patients were transferred to another short-term hospital or to other facilities (e.g., skilled nursing facility, intermediate care, court/law enforcement, or other types of facilities), or died in the ED.[5,6]

Existing literature is limited on contributing factors to hospital admission following ED visits. The objective of this study is to assess characteristics of asthma-related ED visits to identify factors contributing to hospital admission after an ED visit among U.S. children and adults. In this study emergency department visits for asthma that resulted in hospital admissions (i.e., patient being admitted to the same hospital or transferred to another short-term hospital) using discharge data elements from the 2020 Nationwide Emergency Department Sample (NEDS), Healthcare Cost and Utilization Project (HCUP), Agency for Healthcare Research and Quality were examined. Assessing the risk factors associated with hospital admission after an ED visit for asthma is important in identifying affected subpopulations to better serve their healthcare needs.

Methods

Data and variable description

The study examined dispositions of patients with asthma diagnosis from the ED and ED visits for asthma that resulted in a hospital admission using discharge data elements from the 2020 Nationwide Emergency Department Sample (NEDS), Healthcare Cost and Utilization Project (HCUP), Agency for Healthcare Research and Quality.[7] NEDS is one of the Healthcare Cost and Utilization Project (HCUP)'s healthcare databases. HCUP was developed through a federal, state, and industry partnership and sponsored by the Agency for Healthcare Research and Quality (AHRQ). The Nationwide Emergency Department Sample (NEDS) is a large all-payer emergency department database in the United States, yielding national estimates of hospital-owned ED visits. The NEDS contains unweighted data from over 28 million ED visits each year and weighted estimates of approximately

123 million ED visits. The database tracks information about ED visits across the country, which includes geographic areas, hospital and patient characteristics, and nature of visits (e.g., common reasons for ED visits including acute conditions, chronic conditions, and injuries).[6] The NEDS is sampled from the U.S. hospital-owned emergency departments with data in the HCUP State Emergency Department Databases (SEDD) and the State Inpatient Databases (SID). The NEDS is a stratified probability sample of a set of hospital owned EDs. Sampling probabilities were calculated to a select 20 percent of the universe contained in each stratum, which was defined by region, trauma designation, urban-rural location, teaching status, and hospital ownership or control. For additional information regarding NEDS, see https://www.hcup-us.ahrq.gov/db/nation/neds/nedsdbdocumentation.jsp.

We analyzed ED visits for asthma that resulted in hospital admissions either to the same hospital where the ED is located or transferred to another short-term hospital. We also analyzed other dispositions of patients with asthma at discharge from the ED, and by race and ethnicity for routine discharge versus admitted to a hospital. An asthma ED visit was defined as an ED visit with asthma as the primary diagnosis (ICD-10-CM diagnosis code of J45). Select characteristics of ED visits among U.S. children (under age 18 years) and adults (aged 18 years or older) were examined. Those characteristics included sex (male, female), children (ages 0–17 years) vs. adults (ages ≥18 years), age group (0–2, 3–5, 6–11, 12–17, 18–34, 35–54, 55–64, and ≥65 years), and race and ethnicity (White, Black, Other race, and Hispanic or Latino persons). The “Other race” group includes Asian or Pacific Islander, Native American, and persons of other races.[6] We also considered the primary expected source of payment (private insurance including HMO, Medicare, Medicaid, or other/no charge/self-pay), teaching status of hospital (metropolitan, non-teaching; metropolitan, teaching; non-metropolitan), discharge timing (January–March, April–June, July–September, October–December), and median household income quartiles for patient’s ZIP Code ($1–$45,999, $46,000–$58,999, $59,000–$78,999, $79,000 or more).

Statistical methods

All statistical procedures were conducted using SAS software (version 9.4; SAS institute) and SAS-Callable SUDAAN (version 11.0.1; Research Triangle Institute) to account for complex sampling design. Discharge-level weights were provided in the database to produce nationwide visit-level statistics for analyses, using the ED visit as the unit of analysis. Discharge-level weights were used to produce unbiased national annual estimates from sample data.[8] Cell sizes less than or equal to 10 were suppressed.[9] We used Wald chi-square tests to determine statistically significant associations between two categorical variables (using a significance level of 0.05). First, we examined the percentage of disposition of patients with asthma at discharge from the ED and for select categories by race and ethnicity. To identify risk factors associated with hospital admission following an ED visit, we used univariable and multi-variable logistic regression models. The dichotomous outcome variable in the models included ED visits resulting in hospital admission (yes, no), and the independent variables were sex, age, race and ethnicity, the primary expected source of payment, teaching status of hospital, and median household income quartiles for patient’s ZIP Code. Unadjusted (PRs) and adjusted prevalence ratio (aPRs), adjusting for all

other independent variables in the model, with 95% confidence intervals, were calculated for children and adults.

Results

Discharging patients from the emergency department depends on the patients' specific medical conditions and needs. Regardless of age, the majority of discharges from the ED for patients with asthma (all ED visits with asthma as the primary diagnosis [ICD-10-CM diagnosis code of J45]) were treat-and-release (routine: 88.5%) and about 9.8% resulted in hospital admission (8.9% were admitted to the same hospital and 0.9% were transferred to another short-term hospital). Approximately, 0.2% were transferred to other facilities (including skilled nursing facility, intermediate care, and another type of facilities), 0.1% were discharged to home health care, and 1.3% left the ED against medical advice (Table 1).

A higher percentage of ED visits for Black persons (89.5%) and Hispanic persons (88.9%) were treated and released (routine discharge) from the ED and a lower percentage of ED visits for Black persons (7.8%) and Hispanic persons (8.9%) were admitted as an inpatient to the same hospital, compared with White persons (87.4% and 10.7%, respectively) (Table 2).

Emergency department visits for asthma resulting in hospital admission among U.S. children (aged 0–17 years)

About 10.4% (n=28,055) of ED visits for asthma among children aged 0–17 years resulted in a hospital admission to the same hospital or transfer to another short-term hospital. Results from a chi-square ($\chi 2$) test for independence indicate that age group ($P < 0.001$), race and ethnicity ($P = 0.01$), primary expected source of payment ($P < 0.001$), teaching status of hospital ($P < 0.001$), and discharge timing ($P < 0.001$) were significantly associated with hospital admission following an ED visit for asthma. Whereas sex and median household income quartiles for patient's ZIP Code were not associated with hospital admission following the ED visits for asthma (Table 3).

Among children, more ED visits for females (aPR: 1.08, 95% CIs: [1.01, 1,15]), ages 0–2 years (aPR: 1.85 [1.64, 2.09]), ages 3–5 years (aPR: 1.95 [1.72, 2.22]), ages 6–11 years (aPR: 1.37 [1.26, 1.49]), and discharged in January–March (aPR: 1.34 [1.16, 1.54]) or in October–December (aPR: 1.52 [1.33, 1.73]) resulted in hospital admission following an ED visit compared with corresponding reference groups (males, ages 12–17 years, and discharged in April–June, respectively). However, less of the ED visits for Black children (aPR: 0.84 [0.73, 0.97]), Hispanic children (aPR: 0.82 [0.70, 0.97]), payment source of Medicare/Medicaid (aPR: 0.89 [0.82, 0.97]) or other payers/no charge/self-pay (aPR: 0.69 [0.58, 0.81]), for ED visits in metropolitan, non-teaching hospital (aPR: 0.65 [0.54, 0.78]), and non-metropolitan hospital (aPR: 0.57 [0.47, 0.67]) resulted in hospitalization following an ED visit compared with the corresponding reference groups (White children, private insurance including HMOs, and for ED visits in metropolitan, teaching hospital, respectively) (Table 3).

Emergency department visits for asthma resulting in hospital admission among U.S. adults (aged ≥18 years)

About 9.6% (n=68,937) of ED visits for asthma among adults aged ≥18 years resulted in hospital admission to the same hospital or transferred to another short-term hospital. Sex ($P < 0.001$), age group ($P < 0.001$), race and ethnicity ($P < 0.001$), primary expected source of payment ($P < 0.001$), teaching status of hospital ($P < 0.001$), discharge timing ($P < 0.001$), and median household income quartiles for patient's ZIP Code ($P < 0.001$), were all highly associated with hospital admissions following an ED visit for asthma (Table 4). Among adults, more ED visits for females (aPR: 1.36 [1.30, 1,43]), ages 35–54 years (aPR: 1.84 [1.75, 1.94]), ages 55–64 years (aPR: 2.54 [2.36, 2.75]), ages 65 years and more (aPR: 3.22 [2.94, 3.52]), Medicare participants (aPR: 1.40 [1.31, 1.49]), and discharged in January–March (aPR: 1.09 [1.03, 1.16]) resulted in hospital admission following an ED visit compared with corresponding reference groups. The reference groups include males, ages 18–34 years, private insurance including HMOs, and discharged in April–June, respectively. However, less of the ED visits for Black adults (aPR: 0.82 [0.76, 0.89]), adults of Other races (aPR: 0.89 [0.80, 0.99]), Hispanic adults (aPR: 0.86 [0.79, 0.93]), other payers/no charge/self-pay (aPR: 0.82 [0.76, 0.88]), for ED visits in metropolitan, non-teaching hospital (aPR: 0.80 [0.72, 0.88]) or non-metropolitan hospital (aPR: 0.57 [0.51, 0.63]), median household income quartiles for patient's ZIP Code of $1–$45,999 (aPR: 0.90 [0.82, 0.99]), and $46,000–$58,999 (aPR: 0.92 [0.84, 0.99]) resulted in hospital admission following an ED visit compared with corresponding reference groups (White adults, private insurance including HMOs, for ED visits in metropolitan, teaching hospital, discharged in April–June, and median household income quartiles for patient's ZIP Code of $79,999 or more, respectively) (Table 4).

Discussion

In this study, we identified factors associated with hospital admission following an ED visit for asthma among U.S. children and adults. Approximately 10% of ED visits for asthma among children and adults resulted in hospital admission either to the same hospital or a small percentage was to another short-term hospital. We assessed the risk factors for hospital admissions following an ED visit for asthma using the data on select factors available in the 2020 NEDS database such as sex, age, race and ethnicity, the primary expected source of payment, teaching status of hospital, discharge timing, and median household income quartiles for patient's ZIP Code.

The study findings indicate that among children more ED visits for females, ages less than 12 years, and discharged time in January–March or October–December resulted in hospital admission following an ED visit for asthma. Among adults more ED visits for females, ages greater than 34 years, Medicare coverage, and discharged in January–March resulted in hospital admission following an ED visit for asthma. Previously, age and previous admission to hospital were described as predictors of asthma-related pediatric ED visits and hospitalizations.[10] ED visit and hospitalization rates for asthma for Black and Hispanic children and adults are usually much higher than for White persons (i.e., about 4–6 times for Black persons and 2 times more for Hispanic persons).[11] One might expect higher

asthma hospital admission following an ED visit in populations with higher ED visits, such as Black and Hispanic persons. However, this study's results show that hospital admission following an ED visit was lower for Black persons and Hispanic persons compared with that for White persons. This discrepancy can partly be explained by higher percentage of ED visits for Black (89.5%) and Hispanic (88.9%) persons were discharged as routine (treated and released), rather than higher hospital admission compared with White (87.4%) persons (Table 2).

The previous studies[2,4,12] indicate that people from Black and Hispanic groups were less likely to have health care coverage and more likely to use ED for routine asthma care, which might explain the higher ED visits and routine discharge, rather than hospital admission following an ED visit among Black and Hispanic persons. However, further investigation may provide additional information on the reasons for lower hospital admission after an ED visit for asthma among non-White persons despite having higher ED visits.

Type of health care coverage and hospital teaching status were also significantly associated with hospital admission following the ED visits. More adults who visited the ED who had Medicare resulted in hospital admission following an ED visit, and less of ED visits with other pay/no pay/self-pay payment type resulted in hospital admission following an ED visit compared with having private insurance. Medicare plays an essential role in providing health coverage and access to care for the persons 65 years or older (86.2%) and people with disabilities (13.7%) or end-stage renal disease (0.1%).[13] About 60.7% of Medicare beneficiaries in 2019 had one or more health conditions and almost one third (27.9%) had three or more health conditions.[13] Higher hospitalization following the ED visits for asthma among Medicare beneficiaries is not unusual given that older age and having multiple comorbid conditions are highly associated with hospitalization.[14,15,16] In addition, this study shows that less of the ED visits for asthma in metropolitan, non-teaching hospitals and non-metropolitan hospitals resulted in hospital admission following an ED visit compared with metropolitan, teaching hospitals. This difference might be because major teaching hospitals are significantly more likely to provide care for people from racial and ethnic minority groups and to accept complex and seriously ill patients requiring transfer from other institutions for advanced care.[17]

This study comes with some limitations. Factors studied were limited to those available in the HCUP NEDS database. Therefore, this study did not assess all possible factors that may be important in making admission decisions, such as, patients' specific medical conditions (e.g., asthma severity, comorbid conditions), distance from home, unmeasured socio-economic issues, and health system capacity due to data availability.[1,5,14] Consequently, we were unable to ascertain the underlying contributors for these observed differences in hospital admissions following an ED visit for asthma. Another limitation was that the unit of analysis for this study is ED visit, and not individual patients, because the HCUP NEDS database contains encounter-level records, not patient-level records. As a result, the database may contain multiple visits for the same patient if individual patients visit the ED multiple times in a year.[6] This might introduce measurement bias depending on how often this may occur, which we will not know given the lack of uniform patient identifier available that would allow a patient-level analysis to identify individuals with more than one ED visit.[6]

In conclusion, this study's findings indicate that more ED visits for asthma for select characteristics (i.e., for both children and adults, females, White persons, discharged in January–March, and for ED visits in teaching hospitals in metropolitan areas; children ages younger than 12 years; children with private insurance including HMO; adults ages 35 years or older; adults with Medicare coverage; and adults with median household income quartiles for patient's ZIP Code of $79,000 or more) resulted in hospital admissions following an ED visit for asthma. Examining the risk factors associated with hospital admission after an ED visit for asthma is important for identifying these groups and better addressing their needs.

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Table 1.

The disposition of the patient with asthma[a] at discharge from the emergency department (ED) — United States, 2020

Disposition of the patient with asthma at discharge from the ED	All ages				Children with asthma-related emergency department (ED) visits[a]				Adults with asthma-related emergency department (ED) visits[a]			
	Sample size	Weighted number of visits	SE of weighted number	Percent (95% CI)	Sample size	Weighted number of visits	SE of weighted number	Percent (95% CI)	Sample size	Weighted number of visits	SE of weighted number	Percent (95% CI)
Total	**225 420**	986 119	32 575	100.0 (.–.)	61 897	270 286	19 978	100.0 (.–.)	163 522	715 827	22 989	100.0 (.–.)
Routine discharge	**199 651**	873 007	29 097	88.5 (88.0–89.1)	54 941	240 037	18 080	88.8 (87.7–89.9)	144 709	632 964	20 534	88.4 (87.9–88.9)
Transfer to short-term hospital	**2023**	8963	537	0.9 (0.8–1.0)	1284	5765	370	2.1 (1.8–2.6)	739	3197	365	0.4 (0.4–0.6)
Admitted as an inpatient to same hospital	**19 999**	88 034	3897	8.9 (8.4–9.5)	5176	22 289	2385	8.2 (7.2–9.4)	14 823	65 745	2619	9.2 (8.7–9.7)
Other transfers, including skilled nursing facility, intermediate care, and another type of facility	**531**	2425	246	0.2 (0.2–0.3)	233	1086	191	0.4 (0.3–0.6)	298	1338	129	0.2 (0.2–0.2)
Home health care	**258**	1168	131	0.1 (0.1–0.1)	26	124	30	0.0 (0.0–0.1)	232	1045	125	0.1 (0.1–0.2)
Against medical advice	**2948**	12 476	899	1.3 (1.1–1.4)	236	980	99	0.4 (0.3–0.4)	2712	11 496	881	1.6 (1.4–1.8)
Died in ED	__[b]	__[b]	__[b]	__[b]	__[b]	__[b]	__[b]	__[b]	__[b]	__[b]	__[b]	__[b]
Discharged/ transferred to court/law enforcement	__[b]	__[b]	__[b]	__[b]	__[b]	__[b]	__[b]	__[b]	__[b]	__[b]	__[b]	__[b]
Discharged alive but destination is unknown	__[b]	__[b]	__[b]	__[b]	__[b]	__[b]	__[b]	__[b]	__[b]	__[b]	__[b]	__[b]

Abbreviations: ED, Emergency department; SE, standard error; CI, confidence interval.

[a]Primary diagnosis for ED visit was asthma (ICD-10-CM code of J45).

[b]Suppressed because n ≤10 persons.

Data source: 2020 Nationwide Emergency Department Sample (NEDS), Healthcare Cost and Utilization Project (HCUP), Agency for Healthcare Research and Quality.

Table 2.

Select disposition categories at discharge from the ED for the patients with asthma[a] by race and ethnicity — United States, 2020

	All ages Routine discharge				All ages Admitted as an inpatient to same hospital			
	Sample size	**Weighted number of visits**	**SE of weighted number**	**Percent (95% CI)**	**Sample size**	**Weighted number of visits**	**SE of weighted number**	**Percent (95% CI)**
Race and ethnicity	199 651	873 007	29 097	88.5 (88.0–89.1)	19 999	88 034	3897	8.9 (8.4–9.5)
White	68 298	304 558	8803	87.4 (86.8–87.9)	8031	35 443	1445	10.2 (9.6–10.7)
Black	77 456	332 436	19 810	89.5 (88.7–90.2)	6643	28 788	2044	7.8 (7.1–8.5)
Other race[b]	12 892	58 020	4384	87.4 (86.2–88.4)	1518	6799	635	10.2 (9.2–11.4)
Hispanic	36 403	159 573	11 647	88.9 (87.9–89.8)	3580	15 948	1552	8.9 (8.0 –9.9)

Abbreviations: ED, Emergency department; SE, standard error; CI, confidence interval.

[a]Primary diagnosis for ED visit was asthma (ICD-10-CM code of J45).

[b]Other race includes Asian or Pacific Islander, Native American, and other race categories.

Data source: 2020 Nationwide Emergency Department Sample (NEDS), Healthcare Cost and Utilization Project (HCUP), Agency for Healthcare Research and Quality.

Note: numbers within selected characteristics may not sum to total due to rounding. Not all discharge categories were analyzed by race and ethnicity because of small sample sizes.

Table 3.

Emergency department (ED) visits for asthma[a] among children resulting in hospital admission[b] by select characteristics — United States, 2020

Characteristics	Hospital admission[b] following an ED visit for asthma[a]					
	Percent with hospital admission			Chi-square (χ2) Test	Prevalence ratios (PR)	
	Weighted number	Weighted number (SE)	Percent (95% CI)	p-value[c]	Unadjusted PR (95% CI)	Adjusted PR (aPR)[d] (95% CI)
Total	28 055	2392	10.4 (9.3–11.5)			
Sex				0.88		
Male	16 987	1442	10.4 (9.3–11.6)		Referent	Referent
Female	11 067	994	10.3 (9.2–11.6)		1.00 (0.93–1.06)	**1.08 (1.01–1.15)**
Age group (years)				**<0.001**		
0–2	6496	650	13.7 (11.8–15.9)		2.01 (1.77–2.28)	**1.85 (1.64–2.09)**
3–5	6973	698	14.2 (12.6–15.9)		2.07 (1.83–2.35)	**1.95 (1.72–2.22)**
6–11	9423	814	9.6 (8.6–10.7)		1.41 (1.29–1.53)	**1.37 (1.26–1.49)**
12–17	5163	476	6.8 (6.0–7.7)		Referent	Referent
Race and ethnicity				**0.01**		
White	8682	788	11.4 (10.2–12.6)		Referent	Referent
Black	9877	1044	9.7 (8.4–11.2)		0.86 (0.75–0.98)	**0.84 (0.73–0.97)**
Other race	2464	284	12.8 (11.1–14.7)		1.13 (0.99–1.28)	1.04 (0.92–1.18)
Hispanic	6617	984	9.9 (8.4–11.7)		0.87 (0.75–1.01)	**0.82 (0.70–0.97)**
Payer information				**<0.001**		
Medicaid/Medicare	18 420	1654	10.2 (9.1–11.4)		0.86 (0.79–0.93)	**0.89 (0.82–0.97)**
Private, including HMO	7882	709	11.9 (10.7–13.2)		Referent	Referent
Other/no charge/self pay	1727	229	7.6 (6.3–9.1)		0.64 (0.54–0.75)	**0.69 (0.58–0.81)**
Teaching status of hospital where ED located				**<0.001**		
Metropolitan, non-teaching	2734	287	7.2 (6.2–8.3)		0.62 (0.51–0.76)	**0.65 (0.54–0.78)**
Metropolitan, teaching	23 654	2370	11.5 (10.1–13.0)		Referent	Referent
Non-metropolitan	1667	148	6.4 (5.7–7.2)		0.56 (0.47–0.66)	**0.57 (0.47–0.67)**
Discharge timing				**<0.001**		

Characteristics	Hospital admission[b] following an ED visit for asthma[a]					
	Percent with hospital admission			Chi-square (χ2) Test	Prevalence ratios (PR)	
	Weighted number	Weighted number (SE)	Percent (95% CI)	p-value[c]	Unadjusted PR (95% CI)	Adjusted PR (aPR)[d] (95% CI)
January–March	15 147	1399	11.2 (10.0–12.4)		1.58 (1.37–1.83)	**1.34 (1.16–1.54)**
April–June	1842	198	7.0 (6.0–8.3)		Referent	Referent
July–September	3019	282	7.5 (6.6–8.6)		1.07 (0.93–1.22)	1.02 (0.89–1.17)
October–December	8032	717	11.9 (10.5–13.5)		1.69 (1.49–1.92)	**1.52 (1.33–1.73)**
Median household income quartiles for patient's ZIP Code				0.22		
$1–$45,999	10 976	1169	9.8 (8.5–11.2)		0.81 (0.66–1.00)	1.03 (0.88–1.22)
$46,000–$58,999	7354	704	10.5 (9.3–11.7)		0.84 (0.71–1.00)	1.06 (0.92–1.23)
$59,000–$78,999	5538	605	10.8 (9.5–12.3)		0.90 (0.77–1.06)	1.02 (0.89–1.17)
$79,000 or more	4013	420	11.6 (10.1–13.3)		Referent	Referent

Abbreviations: ED, emergency department; SE, standard error; CI, confidence interval; PR, prevalence ratio.

[a] Primary diagnosis for ED visit was asthma (ICD-10-CM code J45).

[b] Admitted to the same hospital from the ED or transfer to a short-term hospital.

[c] p-value of <0.05 is used to determine statistically significant association between two categorical variables using chi-square (χ2) test for independence.

[d] Adjusted for all independent variables in the model.

Note: bold values represent the statistically significant results.

Data source: 2020 Nationwide Emergency Department Sample (NEDS), Healthcare Cost and Utilization Project (HCUP), Agency for Healthcare Research and Quality.

Table 4.

Emergency department (ED) visits for asthma[a] among adults resulting in hospital admission[b] by select characteristics — United States, 2020

Characteristics	Hospital admission[b] following an ED visit for asthma[a]					
	Percent with hospital admission			Chi-square (χ^2) Test	Prevalence ratios (PR)	
	Weighted number	Weighted number (SE)	Percent (95% CI)	p-value[c]	Unadjusted (PR) (95% CI)	Adjusted PR (aPR)[d] (95% CI)
Total	68 937	2669	9.6 (9.1–10.2)			
Sex				**<0.001**		
Male	20 459	873	7.3 (6.8–7.8)		Referent	Referent
Female	48 478	1900	11.2 (10.6–11.8)		1.54 (1.47–1.61)	**1.36 (1.30–1.43)**
Age group (years)				**<0.001**		
18–34	14 832	635	5.0 (4.7–5.3)		Referent	Referent
35–54	25 460	1069	9.7 (9.2–10.3)		1.97 (1.87–2.07)	**1.84 (1.75–1.94)**
55–64	12 712	587	14.5 (13.4–15.8)		2.93 (2.72–3.17)	**2.54 (2.36–2.75)**
65 and over	15 938	724	23.5 (22.1–25.0)		4.74 (4.44–5.06)	**3.22 (2.94–3.52)**
Race and ethnicity				**<0.001**		
White	30 181	1153	11.1 (10.5–11.7)		Referent	Referent
Black	22 401	1546	8.3 (7.6–9.1)		0.75 (0.68–0.82)	**0.82 (0.76–0.89)**
Other race	4865	488	10.3 (9.2–11.5)		0.93 (0.83–1.05)	**0.89 (0.80–0.99)**
Hispanic	10 563	886	9.4 (8.5–10.3)		0.85 (0.77–0.93)	**0.86 (0.79–0.93)**
Payer information				**<0.001**		
Medicare	21 429	943	19.8 (18.7–21.0)		2.18 (2.08–2.30)	**1.40 (1.31–1.49)**
Medicaid	19 706	1022	7.9 (7.4–8.6)		0.87 (0.81–0.94)	0.99 (0.93–1.06)
Private, including HMO	18 444	843	9.1 (8.5–9.6)		Referent	Referent
Other/no charge/self pay	9277	472	6.0 (5.6–6.4)		0.66 (0.61–0.71)	**0.82 (0.76–0.88)**
Teaching status of hospital where ED located				**<0.001**		
Metropolitan, non-teaching	13 237	890	8.6 (7.9–9.3)		0.81 (0.73–0.91)	**0.80 (0.72–0.88)**
Metropolitan, teaching	49 954	2490	10.6 (9.9–11.4)		Referent	Referent
Non-metropolitan	5750	355	6.3 (5.8–6.8)		0.60 (0.54–0.66)	**0.57 (0.51–0.63)**

Characteristics	Hospital admission[b] following an ED visit for asthma[a]					
	Percent with hospital admission			Chi-square ($\chi 2$) Test	Prevalence ratios (PR)	
	Weighted number	Weighted number (SE)	Percent (95% CI)	p-value[c]	Unadjusted (PR) (95% CI)	Adjusted PR (aPR)[d] (95% CI)
Discharge timing				**<0.001**		
January–March	28 460	1096	10.7 (10.1–11.4)		1.18 (1.12–1.25)	**1.09 (1.03–1.16)**
April–June	12 331	528	9.1 (8.5–9.7)		Referent	Referent
July–September	13 190	609	8.9 (8.4–9.6)		0.99 (0.93–1.04)	1.01 (0.95–1.07)
October–December	14 701	653	8.9 (8.3–9.5)		0.98 (0.93–1.03)	1.02 (0.96–1.07)
Median household income quartiles for patient's ZIP Code				**<0.001**		
$1–$45,999	24 186	1489	8.6 (7.9–9.3)		0.70 (0.63–0.77)	**0.90 (0.82–0.99)**
$46,000–$58,999	17 254	886	9.2 (8.6–9.7)		0.74 (0.69–0.81)	**0.92 (0.84–0.99)**
$59,000–$78,999	14 094	773	10.6 (9.9–11.4)		0.86 (0.79–0.94)	0.96 (0.89–1.04)
$79,000 or more	12 150	778	12.3 (11.4–13.3)		Referent	Referent

Abbreviations: ED, emergency department; SE, standard error; CI, confidence interval; PR, prevalence ratio.

[a]Primary diagnosis for ED visit was asthma (ICD-10-CM code J45).

[b]Admitted to the same hospital from the ED or transfer to a short-term hospital.

[c]p-value of <0.05 is used to determine statistically significant association between two categorical variables using chi-square ($\chi 2$) test for independence.

[d]Adjusted for all independent variables in the model.

Note: bold values represent the statistically significant results.

Data source: 2020 Nationwide Emergency Department Sample (NEDS), Healthcare Cost and Utilization Project (HCUP), Agency for Healthcare Research and Quality.