Children’s Mental Health Emergency Department Visits: 2007–2016

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BACKGROUND AND OBJECTIVES: Emergency department (ED) visits for children seeking mental health care have increased. Few studies have examined national patterns and characteristics of EDs that these children present to. In data from the National Pediatric Readiness Project, it is reported that less than half of EDs are prepared to treat children. Our objective is to describe the trends in pediatric mental health visits to US EDs, with a focus on low-volume, nonmetropolitan EDs, which have been shown to be less prepared to provide pediatric emergency care.

METHODS: Using 2007 to 2016 Nationwide Emergency Department Sample databases, we assessed the number of ED visits made by children (5–17 years) with a mental health disorder using descriptive statistics. ED characteristics included pediatric volume, children’s ED classification, and location.

RESULTS: Pediatric ED visits have been stable; however, visits for deliberate self-harm increased 329%, and visits for all mental health disorders rose 60%. Visits for children with a substance use disorder rose 159%, whereas alcohol-related disorders fell 39%. These increased visits occurred among EDs of all pediatric volumes, regardless of children’s ED classification. Visits to low-pediatric-volume and nonmetropolitan areas rose 53% and 41%, respectively.

CONCLUSIONS: Although the total number of pediatric ED visits has remained stable, visits among children with mental health disorders have risen, particularly among youth presenting for deliberate self-harm and substance abuse. The majority of these visits occur at nonchildren’s EDs in both metropolitan and nonurban settings, which have been shown to be less prepared to provide higher-level pediatric emergency care.

WHAT’S KNOWN ON THIS SUBJECT: Emergency department visits for children with mental health disorders have risen, but little is known about the types of emergency departments and the rates of mental health disorders that these children present with for emergency mental health care.

WHAT THIS STUDY ADDS: US children presenting with mental health disorders, particularly deliberate self-harm and substance use disorders, often seek care at facilities that are likely less prepared to provide higher-level pediatric emergency care.
One in five children in the United States experiences a mental health disorder. Emergency departments (EDs) often serve as the safety net for children seeking mental health care. There are more ED visits for children with mental health disorders, with hospitalizations for suicide ideation and suicide attempts more than doubling over the last 10 years.

Children with mental health disorders make up ~2% to 5% of all pediatric ED visits nationally, and this number is increasing. These children are evaluated in all settings ranging from children’s hospital EDs to EDs that see <500 children per year. Most children seeking emergency care are seen in nonchildren’s hospital EDs.

Although the escalation of ED use for children with mental health disorders has been documented in the literature, there have been few studies focused on characteristics of the EDs in which these children seek care. The National Pediatric Readiness Project (NPRP), a collaborative effort between the Health Resources and Services Administration’s (HRSA) Emergency Medical Services for Children program, American Academy of Pediatrics, Emergency Nurses Association, and American College of Emergency Physicians, is a quality improvement initiative that aims to ensure that all US EDs have the essential guidelines and resources in place to provide effective emergency care to children. In data from the NPRP’s Pediatric Readiness Survey, it was reported that less than half of hospital EDs are prepared with policies for children with mental health disorders, and in rural areas, this drops to one-third. Recently, the NPRP has shown that EDs that see small numbers of children are less likely to be prepared to treat children and have worse outcomes, including mortality.

We studied the 10-year trends in pediatric mental health visits in US EDs based on ED characteristics defined from the Pediatric Readiness Survey. Examining the characteristics of EDs that children present to is important because pediatric readiness has been linked to the pediatric volume and geographic location of EDs.

**METHODS**

We used data from the 2007 to 2016 Nationwide Emergency Department Sample (NEDS), Healthcare Cost and Utilization Project, and Agency for Healthcare Research and Quality. NEDS tracks information about ED visits across the country and includes geographic, hospital, and patient information. NEDS is the largest all-payer ED database publicly available in the United States and contains information for ~20% of US EDs. NEDS is a stratified sample of US hospital-owned EDs, which is representative of all US EDs because the sampling frame takes into account important hospital characteristics, such as geographic region, trauma center level, urban or rural location, teaching status, and hospital.

We analyzed NEDS by looking at patient demographics, mental health conditions, and hospital ED characteristics.

**Patient Demographics**

Patient demographic information, such as sex, age, and ED disposition, was examined. We restricted the sample to children ages 5 to 17 years because age of onset for most mental health conditions typically does not occur before age 5. Age was then categorized into tertiles: 5 to 9, 10 to 14, and 15 to 17 years. We then grouped children into 3 groups: (1) children with any mental health disorders, (2) children with substance use disorders, and (3) children who presented for deliberate self-harm.

**Hospital ED Characteristics**

We classified pediatric ED volume for each site on the basis of the nationally representative Pediatric Readiness Survey categories, with the classifications of low (<4000), medium (4000–9999), high...
TABLE 1 Patient and Hospital Characteristics of ED Visits by Children with a Mental Health Disorder, 2007 vs 2016

<table>
<thead>
<tr>
<th></th>
<th>Rate, per 1000 Population</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2007</td>
</tr>
<tr>
<td>Age, y</td>
<td></td>
</tr>
<tr>
<td>5–9</td>
<td>6.9</td>
</tr>
<tr>
<td>10–14</td>
<td>14.5</td>
</tr>
<tr>
<td>15–17</td>
<td>31.2</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>16.9</td>
</tr>
<tr>
<td>Female</td>
<td>14.7</td>
</tr>
<tr>
<td>All pediatric ED visits</td>
<td>273.5</td>
</tr>
<tr>
<td>Mental health disorders</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>15.9</td>
</tr>
<tr>
<td>Any mental disorder</td>
<td>14.0</td>
</tr>
<tr>
<td>650: adjustment disorders</td>
<td>0.7</td>
</tr>
<tr>
<td>651: anxiety disorders</td>
<td>2.8</td>
</tr>
<tr>
<td>652: attention-deficit conduct and disruptive behavior disorders</td>
<td>5.8</td>
</tr>
<tr>
<td>656: impulse control disorders NEC</td>
<td>0.2</td>
</tr>
<tr>
<td>657: mood disorders</td>
<td>5.2</td>
</tr>
<tr>
<td>658: schizophrenia and other psychotic disorders</td>
<td>0.4</td>
</tr>
<tr>
<td>Miscellaneous mental health disorders</td>
<td>2.6</td>
</tr>
<tr>
<td>Substance use disorder</td>
<td>2.6</td>
</tr>
<tr>
<td>660: alcohol-related disorders</td>
<td>1.4</td>
</tr>
<tr>
<td>661: substance-related disorders</td>
<td>1.5</td>
</tr>
<tr>
<td>662: deliberate self-harm</td>
<td>1.1</td>
</tr>
<tr>
<td>ED disposition</td>
<td></td>
</tr>
<tr>
<td>ED visit in which the patient is treated and released</td>
<td>12.5</td>
</tr>
<tr>
<td>ED visit in which the patient is admitted to this same hospital</td>
<td>2.4</td>
</tr>
<tr>
<td>ED visit in which the patient is transferred to another short-term hospital</td>
<td>0.4</td>
</tr>
<tr>
<td>ED visit in which the patient died in the ED</td>
<td>0.0</td>
</tr>
<tr>
<td>Other</td>
<td>0.5</td>
</tr>
<tr>
<td>ED volume</td>
<td></td>
</tr>
<tr>
<td>Low (&lt;4000)</td>
<td>2.5</td>
</tr>
<tr>
<td>Medium (4000–8999)</td>
<td>6.3</td>
</tr>
<tr>
<td>High (10000–24999)</td>
<td>4.3</td>
</tr>
<tr>
<td>Very high (25000–49999)</td>
<td>1.6</td>
</tr>
<tr>
<td>Extremely high (≥50000)</td>
<td>1.1</td>
</tr>
<tr>
<td>Children's hospital</td>
<td></td>
</tr>
<tr>
<td>Nonchildren's hospital</td>
<td>14.6</td>
</tr>
<tr>
<td>Children's hospital</td>
<td>1.2</td>
</tr>
<tr>
<td>Hospital urban-rural location</td>
<td></td>
</tr>
<tr>
<td>Large metropolitan area with at least 1 million residents</td>
<td>7.0</td>
</tr>
<tr>
<td>Small metropolitan areas with &lt;1 million residents</td>
<td>4.2</td>
</tr>
<tr>
<td>Micropolitan areas</td>
<td>1.7</td>
</tr>
<tr>
<td>Net metropolitan or micropolitan (nonurban residual)</td>
<td>0.7</td>
</tr>
</tbody>
</table>

NEC, not elsewhere classifiable

* Inclusive of the following: CCS 653, delirium dementia and amnestic and other cognitive disorders; CCS 654, developmental disorders; CCS 655, disorders usually diagnosed in infancy, childhood or adolescence; and CCS 670, miscellaneous mental health disorders.

(10 000–24 999), very high (25 000–49 999), and extremely high (≥50 000). Identification of children's hospital EDs was determined by taking the median age of all patients treated in a specific ED. A distinctive bimodal distribution was detected in which children's hospital EDs had a median age of 10 years or less, whereas nonchildren's hospital EDs had a median age of >20. NEDS has ED urban-rural location split into a 4-category designation on the basis of the US Office of Management and Budget metropolitan and micropolitan statistical area standards. These categories are as follows: large metropolitan areas with at least 1 million residents, small metropolitan areas with <1 million residents, micropolitan areas, and not metropolitan or micropolitan (the last is essentially a nonurban residual). Metropolitan and micropolitan statistical areas are standards defined as having a core area containing a substantial population nucleus and close economic and social ties to nearby communities.2,3

Statistical Analyses

Survey weighted data analytic methods were used to calculate national estimates for each year.
We used US Census data to estimate the population of corresponding age groups and then calculated incidence rates per 1000 population by demographics, diagnosis category, and hospital characteristics. We used t tests to determine the statistical significance of the difference between the rates. We calculated the percentage of changes from 2007 to 2016 and confidence intervals. All the analyses were done by using SAS (Enterprise Guide, Version 7.11 HF3 [SAS Institute, Inc, Cary, NC]).

RESULTS

Over the 10-year study period, pediatric ED visits were stable; however, pediatric ED visits for all mental health disorders rose 60% (P < .001) (Table 1, Fig 1). Mental health ED visits among all 3 age tertiles rose, most notably a 68% increase in visits among the 15- to 17-year-old group (P < .001).

Significant rate increases were also observed among both sexes and was more pronounced among girls, with 74% (P < .001). Anxiety disorders (CCS 651) and impulse control disorders (CCS 656) significantly increased by 117% (P < .001) and 111% (P < .001), respectively (Table 1). All substance use disorders rose by 75% (P < .001), with alcohol-related disorders decreasing by nearly 40% (P < .001), whereas substance use disorders significantly increased by >150% (P < .001) (Table 1, Fig 1). ED visits for deliberate self-harm increased 329% (P < .001) over the 10-year study period (Table 1, Fig 1). The rates for treated and released and transferred to another facility both rose 70% and 134%, respectively (P < .001; Table 1).

DISCUSSION

Over the 10-year study period, pediatric ED visits were stable; however, pediatric ED visits for all mental health disorders rose 60%. Importantly, we observed a threefold increase in ED visits for deliberate self-harm, similar to trends reported by authors of other studies, suggesting that children are increasingly engaging in self-harm.9,10,24 Similarly, Torio et al4 found increasing visits by children for mental health conditions between 2006 and 2011, and Kalb et al’s10 National Hospital Ambulatory Medical Care Survey study found similar trends, particularly among those presenting for a suicide-related visit. However, neither of these studies examined hospital characteristics, specifically the number of pediatric ED visits, and the data used are older.

We found that all substance use disorders rose 75%, largely driven by the almost twofold increase in the substance use disorders subgroup and not the alcohol disorders subgroup, which other studies have
The rate increase in substance use disorders, despite the decline in alcohol use disorders, bears further investigation, especially as the opiate epidemic continues to escalate. EDs, regardless of pediatric specialty, volume, and location, will need to be prepared to handle these cases.

Although the increased rate of pediatric mental health visits was greatest among high-pediatric-volume EDs, our results show that all EDs, regardless of pediatric volume, experienced increased visits by children for mental health disorders. These visits increased by one-half among low-pediatric-volume EDs. The National Pediatric Readiness Assessment, conducted in 2013, found that lower-pediatric-volume EDs, with <4000 pediatric visits per year, and rural EDs are less prepared for all pediatric emergencies, and only one-third have pediatric mental health policies or mental health transfer agreements. Our findings of increased pediatric ED visits for mental health at smaller-volume EDs in rural centers are concerning given the potential decreased pediatric readiness for children with mental health problems. It will be important to focus future mental health preparedness efforts and resources on all hospital EDs, particularly smaller-volume and rural EDs, and not just on children’s hospital EDs. HRSA’s recently published Critical Crossroads Care Pathway toolkit for EDs further highlights the rising rates of pediatric behavioral health conditions amid the gaps in hospital preparedness. This is a toolkit for EDs that is focused on pediatric mental health visits and offers a customizable framework with resources that can be used in all settings to improve the coordination and continuity of care for children presenting with mental health disorders. Toolkits and online trainings addressing other important components of pediatric readiness, such as interfacility transfer guidelines, are available and scalable to work within the resources available. They offer pragmatic, actionable recommendations to effect change, especially in less-resourced, rural EDs.

An opportunity to increase mental health services in rural, lower-volume EDs could include tele-mental health services. Telemedicine could also provide an avenue for increasing access to behavioral health specialists who can screen, assist with acute interventions, and support connections to continued care within the community, thereby avoiding long-distance transfers, transportation costs, and delays in care. Recent literature looking at the use of telephone consultation programs on the impact of children’s mental health care use have shown that the accessibility of these programs has led to greater difficulties in access and care. However, telemedicine offers a potential solution to address these challenges.
There is a nationwide shortage of mental health care providers, especially in nonurban areas. This gap between the supply of providers and the demand for mental health services has become especially pronounced among those who specialize in providing care to children. This shortage will have a direct impact on the accessibility and quality of mental health care of children, particularly those who live in rural areas, are younger, and are uninsured.

As the number of pediatric mental health visits continues to rise in EDs, research is needed to identify actionable solutions that will better equip all EDs with the tools, personnel, and resources to better manage these cases. Solutions like screening and assessment efforts for suicidal ideation, a requirement of the Joint Commission for all patients being evaluated for behavioral health conditions, may impact and improve the quality and safety of care for children now and in years to come. Further work exploring alternative care delivery methods, such as telepsychiatry and establishing partnership programs with institutions that have specialized pediatric mental health resources, can better ensure continuity of care and help address the mental health crisis that US EDs are facing.

This study has some limitations. NEDS is a national database but does not have patient identifiers that would allow for tracking of ED recidivism. Also, by design, NEDS does not have a primary diagnosis code, so children may be presenting for some reason other than their mental health condition. However, ED care has increasingly become more patient centered and mental health sensitive so that providers can adjust their practice to deliver more mental health–informed care. There is also the potential that cases were missed if the child did not have a diagnosis for one of the mental health conditions before presentation to the ED. However, because we limited our analysis to age 5 years and above, age of onset for these conditions is more likely to have occurred by then. Information on presence of inpatient pediatric psychiatric beds and on transfers to appropriate facilities (eg, pediatric transfer guidelines, interfacility agreements, etc) is not available in NEDS. The ability of NEDS to identify children's hospitals is limited and as such does not explicitly sample children's hospitals. We circumvented this by categorizing each facility by the median age of the patient; however, this may not have been foolproof, which may explain how the rate change was not statistically significant.
CONCLUSIONS

Although the total number of pediatric ED visits has remained stable, visits among children with mental health disorders have steadily risen, with ED visits by children presenting with deliberate self-harm tripling over the 10-year study period. The majority of children presenting with mental health disorders did not seek care at specialized pediatric EDs. We demonstrated significantly increased visits by children with mental health disorders to small-pediatric-volume, rural EDs that may be least likely to be prepared to provide higher-level pediatric care.

ACKNOWLEDGMENTS

The findings and conclusions in this report are those of the authors and do not necessarily reflect the official position of the HRSA. The authors would like to acknowledge Doug MacDowell for his assistance with the preparation of figures and tables.

ABBREVIATIONS

CCS: Clinical Classification Software
ED: emergency department
HRSA: Health Resources and Services Administration
ICD-9: International Classification of Diseases, Ninth Revision
ICD-10: International Classification of Diseases, Tenth Revision
NEDS: Nationwide Emergency Department Sample
NPRP: National Pediatric Readiness Project

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FINANCIAL DISCLOSURE: The authors have indicated they have no financial relationships relevant to this article to disclose.

FUNDING: No external funding.

POTENTIAL CONFLICT OF INTEREST: The authors have indicated they have no potential conflicts of interest to disclose.

COMPANION PAPER: A companion to this article can be found online at www.pediatrics.org/cgi/doi/10.1542/peds.2019-3542.


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*Pediatrics* 2020;145;
DOI: 10.1542/peds.2019-1536 originally published online May 11, 2020;

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