



# Health Care Utilization and Spending for Children With Mental Health Conditions in Medicaid

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## ABSTRACT

**OBJECTIVE:** To examine how characteristics vary between children with any mental health (MH) diagnosis who have typical spending and the highest spending; to identify independent predictors of highest spending; and to examine drivers of spending groups.

**METHODS:** This retrospective analysis utilized 2016 Medicaid claims from 11 states and included 775,945 children ages 3 to 17 years with any MH diagnosis and at least 11 months of continuous coverage. We compared demographic characteristics and Medicaid expenditures based on total health care spending: the top 1% (highest-spending) and remaining 99% (typical-spending). We used chi-squared tests to compare the 2 groups and adjusted logistic regression to identify independent predictors of being in the top 1% highest-spending group.

**RESULTS:** Children with MH conditions accounted for 55% of Medicaid spending among 3- to 17-year olds. Patients in the highest-spending group were more likely to be older, have multiple MH conditions, and have complex chronic physical health conditions ( $P < .001$ ). The highest-spending group had

\$164,003 per-member-per-year (PMPY) in total health care spending, compared to \$6097 PMPY in the typical-spending group. Ambulatory MH services contributed the largest proportion (40%) of expenditures (\$2455 PMPY) in the typical-spending group; general health hospitalizations contributed the largest proportion (36%) of expenditures (\$58,363 PMPY) in the highest-spending group.

**CONCLUSIONS:** Among children with MH conditions, mental and physical health comorbidities were common and spending for general health care outpaced spending for MH care. Future research and quality initiatives should focus on integrating MH and physical health care services and investigate whether current spending on MH services supports high-quality MH care.

**KEYWORDS:** health care spending; Medicaid; mental health; utilization

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## WHAT’S NEW

Children with mental health conditions had more spending for general and physical health care than for mental health care. Characteristics associated with higher spending included older age, having multiple mental health conditions, and having a complex chronic physical health condition ( $P < .001$ ).

ONE IN 5 US children has a mental health (MH) condition,<sup>1</sup> and MH services account for a large proportion of health care encounters and spending in children.<sup>2</sup> Health care spending is increasing nationally,<sup>3</sup> with a disproportionate portion of expenditures attributed to patients with

the highest spending.<sup>4</sup> Among adult high-spending patients and high-spending pediatric patients with complex chronic conditions, high spending is often driven by emergency department (ED) and inpatient visits.<sup>5–7</sup> Among children with MH conditions, relationships between utilization and spending are not well understood. Children with MH conditions are a priority population for understanding health services utilization and spending, given the prevalence of MH conditions, unmet MH needs, and increased use of high-cost services such as ED and inpatient visits for MH crises.<sup>8–10</sup>

Understanding needs of high-spending patients has enabled health systems to improve quality, reduce costs, and develop novel models of care coordination and

delivery.<sup>10,11</sup> For example, among adults with frequent ED visits, novel health service models that address social determinants of health have better met patients' needs and reduced spending. Among children with physical health conditions, for approximately half of high-spending children with complex chronic physical health conditions, high spending is a marker of a transient health crisis, such as a hospitalization.<sup>2,7</sup> These findings have informed quality programs designed to keep children safely out of the hospital. Less is known about what drives high spending among children with MH conditions. Understanding high spending among children with MH conditions can identify opportunities to help prevent mental and physical health crises and possibly liberate resources to ensure health services are available to more children.

We conducted this study in order to understand and compare health care spending for the highest-spending and typical-spending children with MH conditions. Using the Pareto principle,<sup>12</sup> we selected the top 1% of patients with the highest health care spending for analysis. We hypothesized that 1) patients in each health care spending category (highest vs typical) have different clinical and demographic characteristics and 2) categories of expenditures differ between the 2 groups. To address this knowledge gap, using a large sample of Medicaid-insured children, we examined 1) clinical and demographic characteristics associated with being in the highest spending group and 2) the breakdown of which subcategories of health care utilization contributed to spending in the highest-spending and typical-spending groups. As a secondary objective, we compared general and MH spending within and across groups in order to understand which categories of services utilization were most prevalent and the biggest drivers of expenditures among the highest-spending and typical-spending patients.

## METHODS

### STUDY DESIGN, DATA SOURCE, AND STUDY SAMPLE

We conducted a retrospective cross-sectional analysis of the 2016 IBM Watson Health MarketScan Medicaid claims database (Armonk, NY). This database contains paid health care claims for beneficiaries from 11 de-identified states in diverse geographic regions of the United States. Our sample included children ages 3 to 17 years who were enrolled in a plan that provided both medical and MH and substance abuse coverage (ie, did not carve out behavioral health services), had at least 11 months of continuous coverage during the study year, and had any MH diagnosis.

In order to identify children with any MH diagnoses, we examined all diagnoses from all encounters (ie, any diagnosis in any position). Using a published definition, we classified children as having any MH diagnosis if they had at least 1 inpatient or ED claim or 2 outpatient claims associated with the same MH diagnosis.<sup>13</sup> We categorized MH diagnoses using an algorithm based on ICD-10-CM codes that identifies pediatric MH diagnoses in administrative data sources,<sup>8,14,15</sup> MH diagnoses were classified

into 21 mutually exclusive categories (eg, Depressive Disorders, Anxiety Disorders, Autism Spectrum Disorders).

### HEALTH CARE SPENDING GROUPS

We examined all mental and physical health care claims for the year and calculated total Medicaid expenditures for children with MH conditions. Per-claim spending was determined by a standardized payment per unit of service,<sup>2,16</sup> calculated from all fee-for-service claims. We identified patients in the top 1% of expenditures as being in the highest-spending group, and the remaining 99% of patients as being in the typical-spending group.

### HEALTH CARE SPENDING CATEGORIES

For both highest-spending and typical-spending patients, we examined the following specific categories of expenditures in order to identify drivers of spending: inpatient services, ED services, office visits, pharmacy, dental care, diagnostic testing (eg, laboratory, radiology), miscellaneous therapies (eg, physical, occupational, and speech therapy), and other services (eg, durable medical equipment), using previously described methods.<sup>2</sup> For inpatient, ED, ambulatory, and pharmacy categories, we distinguished MH claims from general health claims using the methods described below.

For inpatient hospital stays, we used facility, place of service, and revenue codes to determine location (eg, dedicated MH facility) and the Diagnosis-Related Group (DRG) classification system<sup>17</sup> to identify the primary indication for hospitalization. Inpatient MH hospitalizations included all hospitalizations in specialty MH hospital units, long-term/residential MH programs, and hospitalizations in general acute-care hospital units with a MH DRG (including those with no physical health treatments, that is, "psychiatric boarding"<sup>18,19</sup>). Inpatient general hospitalizations included hospitalizations in general hospital units for primary physical health reasons (ie, not a MH DRG).

For ED services, we used place of service codes to determine the location and ICD-10-CM diagnosis codes to determine the reason for the visit. MH emergency visits included visits to specialty MH EDs and visits to general EDs with only ICD-10-CM codes for MH diagnoses (ie, no co-occurring non-MH code). General ED visits included visits to general EDs with any non-MH ICD-10-CM code (ie, visits with both MH and non-MH diagnoses were categorized as general ED visits). Thus, ED visits for suicide attempts with any physical health diagnoses were classified as general visits.

For ambulatory office visits, we used provider type codes to determine a clinician's specialty and ICD-10-CM codes to determine the reason for the visit. MH ambulatory office visits included visits with MH specialists (ie, psychologists, psychiatrists, psychiatric nurses, and clinicians working in ambulatory MH or substance abuse treatment facilities), and visits with clinicians from any specialty with an accompanying ICD-10-CM code for a MH diagnosis. This would capture, for example,

management of psychiatric medications by a primary care provider. General ambulatory office visits included visits with non-MH-specialist clinicians that had no MH diagnoses. Clinicians who were identified in claims by credentials but not specialty (eg, medical doctor, nurse practitioner) were classified as non-MH specialists.

For pharmacy claims, medications were classified using the American Hospital Formulary Service Classification Compilation,<sup>20</sup> which provides “therapeutic class” (eg, amphetamine stimulant) and “generic drug names” (eg, methylphenidate hydrochloride). MH medications included antidepressants, antipsychotics, stimulants, and nonstimulant medications for attention-deficit hyperactivity disorder. General medications included medications with no MH indications (eg, analgesics, antibiotics). Since we could not determine medication indication from administrative claims, we also classified antiepileptic drugs, benzodiazepines, and clonidine as general medications, since they are commonly used to treat seizures and hypertension, in order to avoid over-estimating MH medication utilization.

#### HEALTH CARE UTILIZATION

Using the services classification approach described above, we captured the number of patients in our MH group who utilized each type of service during the study year as well as the number of encounters among those who utilized a given service. We captured utilization data for inpatient, ED, ambulatory, and pharmacy services for both MH and general health reasons.

#### COVARIATES

We captured additional patient sociodemographic characteristics, including age, sex, race/ethnicity, Medicaid plan type (fee-for-service or capitated), basis for Medicaid eligibility (disability, other, missing). Excluding the diagnoses used to identify MH conditions, we used the remaining diagnoses to identify clinical characteristics: non-complex chronic physical health conditions<sup>21</sup> and complex chronic physical health conditions.<sup>22</sup>

#### ANALYSES

We generated descriptive statistics to characterize the overall sample of children with MH conditions, comparing the highest- and typical-spending subgroups. We used chi-square tests to compare characteristics between groups. We measured which child characteristics were independently associated with being in the top 1% highest-spending group using a logistic regression model adjusted for all patient characteristics listed in [Table 1](#).

To assess costs overall and within spending categories, we calculated per-member-per-year (PMPY) expenditures by dividing the payments by the number of enrollees.<sup>23</sup> We used Kruskal-Wallis tests to compare expenditures and utilization across the spending categories (ie, inpatient, ED, ambulatory, and pharmacy).

We used SAS version 9.4 (SAS Institute, Cary, NC) for all analyses. This study of de-identified administrative

claims was considered exempt from review by the Children’s Hospital of Philadelphia Institutional Review Board.

## RESULTS

### STUDY POPULATION

We included 775,945 3- to 17-year olds enrolled in Medicaid who had a MH condition, which made up 19% of the overall Medicaid population in the dataset in that age range, consistent with prior data.<sup>24</sup> Fifty-nine percent had 1 MH condition; 23% had 2, and 18% had 3 or more. In addition to MH conditions, 64% had a physical health condition. Specifically, 53% had a noncomplex chronic physical health condition (eg, asthma, obesity), and 11% had a complex chronic physical health condition (eg, muscular dystrophy, cystic fibrosis). [Supplemental Table 1](#) shows characteristics of the children with MH conditions in our sample, compared to children in Medicaid with no MH conditions.

### TOTAL HEALTH CARE SPENDING AND RESOURCE USE

Total health care spending for patients with a MH condition was \$5.3 billion (\$7676 PMPY). For comparison, total health care spending for all 3- to 17-year-old patients in Medicaid was \$9.7 billion; thus 55% of all health care spending for 3- to 17-year-old patients in Medicaid was for children with a MH condition. Children with MH conditions in the top first percentile incurred 21% of all spending among MH patients (\$1.3 billion spending for highest-spending MH patients/\$5.3 billion total spending for MH patients) or 13% of spending among all 3- to 17-year olds in Medicaid (\$1.3 billion spending for highest-spending MH patients/\$9.7 billion total spending for all patients).

### COMPARISON OF MEDICAID MH PATIENTS WITH THE HIGHEST SPENDING VERSUS TYPICAL SPENDING

Child sociodemographic and clinical characteristics significantly varied by spending group ([Table 1](#)). In unadjusted bivariate comparisons, children in the highest-spending group were more likely to be ages 13 to 17 years (48% vs 35,  $P < .001$ ), more often enrolled in fee-for-service Medicaid plans (67% vs 33%,  $P < .001$ ), and more likely to be eligible for Medicaid because of disability (52% vs 11%,  $P < .001$ ). Children in the highest-spending group were more likely to have specific MH diagnoses, with the exception of attention-deficit hyperactivity disorder. Children with the highest spending also had higher rates of comorbidity. Highest spenders were more likely than typical spenders to have multiple MH conditions (70% vs 41%,  $P < .001$ ), and nearly half of highest spenders had 3 or more MH conditions (47% vs 18% of typical spenders,  $P < .001$ ). Highest spenders were also more likely to have complex chronic physical health conditions (75% vs 10% of typical spenders,  $P < .001$ ) and chronic physical health conditions (95% vs 64% of typical spenders,  $P < .001$ ).

**Table 1.** Clinical Characteristics of Pediatric Medicaid Beneficiaries With a Mental Health Diagnosis, Across Spending Group

	Typical Spending* (99%)	Highest Spending (Top 1%)
N	768,185	7760
Demographic characteristics		
Age in years, n (%)		
3–8	260,130 (34)	2170 (28)
9–12	242,800 (32)	1835 (24)
13–17	265,255 (35)	3755 (48)
Male, N (%)	466,797 (61)	4481 (58)
Race/ethnicity, n (%)		
White, non-Hispanic	430,432 (56)	4060 (52)
Black, non-Hispanic	220,297 (29)	2030 (26)
Hispanic	38,779 (5)	366 (5)
Other	17,019 (2)	165 (2)
Missing	61,658 (8)	1139 (15)
Type of Medicaid plan, n (%)		
Fee-for-service	254,276 (33)	5197 (67)
Capitated	513,909 (67)	2563 (33)
Medicaid eligibility, n (%)		
Disability	81,599 (11)	3997 (52)
Income	674,247 (87)	3702 (48)
Missing	12,339 (2)	61 (1)
Mental health conditions, <sup>†</sup> n (%)		
Anxiety disorders	92,896 (12)	1361 (18)
Attention deficit hyperactivity disorder	358,121 (47)	2338 (30)
Autism spectrum disorder	53,456 (7)	1212 (16)
Bipolar disorder	22,220 (3)	975 (13)
Communication disorders	110,135 (14)	1059 (14)
Depressive disorders	107,043 (14)	1905 (25)
Developmental disorder	41,296 (5)	1843 (24)
Disruptive, impulse control, and conduct disorders	127,763 (17)	1949 (25)
Intellectual disability	24,732 (3)	2347 (30)
Learning disorders	97,286 (13)	1388 (18)
Psychotic disorders	6477 (1)	445 (6)
Substance use disorders	25,057 (3)	566 (7)
Suicide attempt	7843 (1)	881 (11)
Suicide ideation	15,227 (2)	497 (6)
Tic disorders	21,034 (3)	715 (9)
Other mental health condition	73,867 (10)	2344 (30)
Number of mental health conditions, n (%)		
1	452,158 (59)	2321 (30)
2	178,323 (23)	1779 (23)
3 or more	137,704 (18)	3660 (47)
Physical health conditions, <sup>‡</sup> n (%)		
None	276,138 (36)	418 (5)
Any physical health condition	492,047 (64)	7,342 (95)
Chronic, noncomplex	412,457 (54)	1541 (20)
Complex chronic	79,590 (10)	5801 (75)

\*All characteristics varied significantly ( $P < .001$ ) between spending groups;

†Patients could have MH conditions in more than 1 category;

‡Physical health condition categories are mutually exclusive.

Predictors of being in the highest-spending group using a multivariable regression model are summarized in [Table 2](#). Having a complex chronic condition was the strongest independent predictor of being in the highest-spending group (adjusted odds ratio [AOR] 19.98, 95% confidence interval [CI]: 18.02–22.16). Other factors independently associated with being in the highest-spending group included: having a fee-for-service Medicaid plan (AOR 2.23, 95% CI: 2.11–2.36), Medicaid eligibility due to disability (AOR 2.7, 95% CI: 2.54–2.87), intellectual disability (AOR 2.51, 95% CI: 2.35–2.68), suicide attempt (AOR 5.48, 95% CI: 4.96–6.04), and having a

chronic noncomplex physical health condition (AOR 2.12, 95% CI: 1.9–2.36).

#### DISTRIBUTION OF SPENDING FOR THE HIGHEST-SPENDING VERSUS TYPICAL-SPENDING PATIENTS

Total PMPY spending for all mental and physical health care was \$164,003 for the highest-spending patients (ie, top first percentile) and \$6907 PMPY for typical-spending patients. For children in the typical-spending group, the largest proportions of expenditures were attributable to ambulatory MH care (37%, \$2455 PMPY), MH

**Table 2.** Clinical Characteristics Associated With Higher Spending Among Pediatric Medicaid Beneficiaries With a Mental Health Diagnosis, From an Adjusted Regression Model

	Independent Predictors of Being in Highest-Spending Group Adjusted <sup>‡</sup> Odds Ratio (95% CI)
N	
Demographic characteristics	
Age in years	
3–8	1.01 (0.95, 1.09)
9–12	0.91 (0.85, 0.97)
13–17	Ref
Male, N (%)	1.15 (1.09, 1.21)
Race/ethnicity	
White, non-Hispanic	Ref
Black, non-Hispanic	1.17 (1.1, 1.24)
Hispanic	0.91 (0.82, 1.03)
Other	1.07 (0.9, 1.26)
Missing	0.74 (0.69, 0.8)
Type of Medicaid plan	
Fee-for-service	2.23 (2.11, 2.36)
Capitated	Ref
Medicaid eligibility	
Disability	2.7 (2.54, 2.87)
Income	Ref
Missing	1.12 (0.86, 1.46)
Mental health conditions*	
Anxiety disorders	1.07 (0.99, 1.15)
Attention deficit hyperactivity disorder	0.6 (0.56, 0.64)
Autism spectrum disorder	0.77 (0.71, 0.82)
Bipolar disorder	1.95 (1.78, 2.14)
Communication disorders	0.79 (0.73, 0.85)
Depressive disorders	1.28 (1.19, 1.39)
Developmental disorder	1.94 (1.81, 2.07)
Disruptive, impulse control, and conduct disorders	1.52 (1.42, 1.63)
Intellectual disability	2.51 (2.35, 2.68)
Learning disorders	0.76 (0.7, 0.81)
Psychotic disorders	1.51 (1.33, 1.71)
Substance use disorders	1.35 (1.21, 1.5)
Suicide attempt	5.48 (4.96, 6.04)
Suicide ideation	1.81 (1.61, 2.04)
Tic disorders	1.31 (1.19, 1.43)
Other mental health condition	1.82 (1.71, 1.93)
Number of mental health conditions	
1	Ref
2	1.16 (1.08, 1.24)
3 or more	1.23 (1.11, 1.35)
Physical health conditions <sup>†</sup>	
None	Ref
Chronic, noncomplex	2.12 (1.9, 2.36)
Complex chronic	19.98 (18.02, 22.16)

CI indicates confidence interval.

\*Patients could have MH conditions in more than 1 category.

†Physical health condition categories are mutually exclusive.

‡The model is adjusted for all covariates represented in the table.

pharmacy (17%, \$803 PMPY), and general pharmacy (9%, \$618).

The distribution of spending on general and MH services differed between spending groups (Table 3). In unadjusted comparisons, the highest-spending patients had a higher percentage of spending on physical health services (73% vs 42%,  $P < .001$ ) and a lower percentage of spending on MH services (27% vs 58%,  $P < .00$ ). The largest proportions of expenditures for children in the highest-spending group were attributable to inpatient general (ie,

non-MH) hospitalizations (36%; \$58,363 PMPY), ambulatory MH services (14%; \$22,803 PMPY), and inpatient MH hospitalization (12%; \$19,691 PMPY). Compared to children with typical spending, children in the highest-spending group were more likely to use all categories of general health services, except dental care. Children in the highest-spending group were more likely to have general and MH hospitalizations as well as ED visits. Highest-spending patients were more likely to use MH ambulatory services than typical-spending patients.

**Table 3.** Health Care Spending for Children With Mental Health Conditions in Medicaid, by Spending Group

Health Service	Total Annual Spending (\$)		Per-Member-Per-Year Spending* (\$)		Within-Spending Group Cost Distribution† (%)	
	99% Lower Spending	Top 1% Highest Spending	99% Lower Spending	Top 1% Highest Spending	99% Lower Spending	Top 1% Highest Spending
Total	4,683,666,570	1,272,666,816	6097	164,003	100	100
Mental health	2,715,344,392	342,278,337	3535	44,108	57	27
Inpatient	197,361,861	152,802,175	257	19,691	2	12
ED	14,938,698	1,115,210	19	144	0	0
Ambulatory	1,885,831,728	176,949,889	2455	22,803	37	14
Pharmacy	617,212,104	11,411,064	803	1470	17	1
General	1,968,322,178	1,272,666,816	2562	119,895	43	73
Inpatient	192,304,830	930,388,479	250	58,363	1	36
ED	200,976,745	452,900,210	262	1234	6	1
Ambulatory	345,590,165	9,573,987	450	16,040	9	10
Pharmacy	474,720,667	124,471,351	618	26,559	9	16
Dental	183,985,509	1,424,673	240	184	6	0
Misc. therapies	238,610,513	22,790,359	311	2937	5	2
Testing	118,909,477	11,460,716	155	1477	3	1
Other	213,224,266	101,670,776	278	13,102	4	8

ED indicates emergency department.

\*Per-member-per-year spending varied significantly ( $P < .001$ ) across the spending groups for all health services.

†The distribution of spending varied significantly ( $P < .001$ ) across the spending groups for all health services.

**INPATIENT AND ED UTILIZATION AND SPENDING**

Use of health care services and number of encounters varied significantly by spending group (Table 4). Of all MH patients, 3.4% were hospitalized for a MH condition and 2.6% for a general health indication. In unadjusted comparisons, hospital use was more common in the highest-spending group compared with typical-spending patients: 21% versus 3.2% for MH hospitalization; 46% versus 2.1% for general hospitalization ( $P < .001$  for both). The median length of stay for a MH hospitalization was 6 days (interquartile range 4, 8), and the median length of stay for a general health hospitalization was 3 days (interquartile range 2, 5). Among 29,766 general health hospitalizations, 46% also had the patient's MH diagnosis associated with the hospitalization. Among all

patients in the sample, 39% had an ED visit. ED visits were more common among the highest-spending patients compared with typical-spending patients: 14% versus 4% for MH ED visits; 59% versus 38% for general ED visits ( $P < .001$  for all).

**AMBULATORY AND PHARMACY UTILIZATION AND SPENDING**

Nearly all patients with any MH diagnosis used ambulatory care; 97% had an ambulatory MH visit, and 83% had an ambulatory general health visit. Forty-two percent of health care spending for patients in the sample was attributable to ambulatory visits (\$2.2 billion). Most patients (81%) had at least 1 prescription drug claim for a general health medication; 50% had a claim for a MH-specific medication (ie, antidepressant, antipsychotic,

**Table 4.** Use of Health Care Services and Number of Encounters Among Children With Mental Health Conditions in Medicaid, by Spending Group

	99% Lower Spending		Top 1% Highest Spending	
	Number of Patients Using Service n (%)*	Encounters Among Utilizers Median, (IQR)	Number of Patients Using Service n (%)*	Encounters Among Utilizers Median, (IQR)
Mental health				
Inpatient	24,838 (3)	1 (1, 2)	1418 (21)	2 (1, 4)
ED	33,217 (4)	1 (1, 1)	892 (13)	2 (1, 4)
Ambulatory	746,479 (97)	10 (4, 28)	6350 (92)	15 (4, 75)
Pharmacy	386,575 (50)	...	3235 (47)	...
General				
Inpatient	16,399 (2)	1 (1, 1)	3535 (46)	2 (1, 4)
ED	295,696 (38)	1 (1, 2)	4566 (59)	2 (1, 3)
Ambulatory	640,116 (83)	3 (2, 6)	6800 (88)	38 (10, 120)
Pharmacy	619,160 (81)	...	7546 (97)	...

ED indicates emergency department; IQR, interquartile range.

- Column is not relevant for the service category.

\*Health care utilization varied significantly ( $P < .001$ ) between spending groups for each category of health service.

stimulant, or nonstimulant medication for attention-deficit hyperactivity disorder).

## DISCUSSION

The study shows that children with MH conditions accounted for 19% of the Medicaid population and 55% of Medicaid spending among 3- to 17-year olds. Among children with any MH condition, half of health care spending was for general health services, and half was for MH services. We identified characteristics and utilization patterns for patients with typical spending and patients with the top 1% highest spending. The highest-spending patients were more likely to have complex and chronic physical health problems, >2 MH diagnoses, and fee-for-service payment plans. For the highest-spending patients, the largest proportion of spending was for general health hospitalizations, and the most commonly used services were pharmacy services (ie, medications). For patients with typical spending, ambulatory MH visits were the most commonly used services and accounted for the largest proportion of spending. Among all MH patients, comorbid conditions were common; 41% of typical-spending patients and 70% of high-spending patients had more than 1 MH condition. Nearly two thirds of typical-spending MH patients had a chronic physical health condition, and among the highest-spending patients, 95% had a chronic physical health conditions.

Among children with MH conditions, aggregate spending for general health care was higher than spending for MH care, and most high spending was driven by general health care, specifically inpatient general health hospitalizations. One possible explanation that might contribute to this finding is that lower spending for MH services reflects cost containment efforts in MH care, such as narrow mental health care provider networks<sup>25</sup> and utilization management programs.<sup>26</sup> Studies have shown that some cost containment programs for MH services in Medicaid have resulted in poor quality MH care. For example, youth enrolled in behavioral health utilization management programs are authorized to receive fewer services than recommended by evidence-based guidelines.<sup>27</sup> Studies of children with ADHD using Medicaid have shown that the proportion receiving no treatment at all ranges from 10% to 44%, medication adherence was low, and a larger than recommended proportion received medication only without concomitant recommended psychotherapy, and 10% of children with ADHD receive no treatment.<sup>28,29</sup> This prior research raises the question whether Medicaid expenditures for MH services are adequate to support recommended MH treatments. Future research to further investigate our findings could focus on understanding to what extent children using Medicaid have unmet need for MH services and whether reimbursement rates are adequate to support clinicians in delivering high-quality evidence-based services.

Our finding that nearly two thirds of children with any MH condition and 95% of highest-spending MH patients had a co-occurring chronic physical health condition

supports the importance of ongoing efforts to integrate MH services into health care across service settings.<sup>30,31</sup> Such efforts are particularly important for children with chronic and complex chronic physical health conditions. Children with chronic and complex chronic physical health conditions were disproportionately represented among the highest-spending population. For some comorbid mental and physical health conditions (eg, depression and inflammatory bowel disease), prior evidence shows that MH services can help prevent disease exacerbations that are costly to children, families, and payers.<sup>32,33</sup> Incorporating MH services into routine care for children with chronic physical illnesses may improve quality of life and generate cost offsets due to fewer disease exacerbations requiring hospitalization. Investing in preventive MH services for children with medical complexity may be of particular interest for accountable care organizations and systems working with value-based or risk-sharing payment models.

General health hospitalizations were the largest contributor to spending in the top 1% highest-spending group. As in other populations of high-spending patients, these hospitalizations could be a marker of a transient health crisis.<sup>4</sup> Previous research has shown that general health hospitalizations are more common among patients with MH conditions than their similarly physically ill peers with no MH conditions,<sup>34,35</sup> and when these hospitalizations occur, they are more likely to be longer,<sup>36</sup> have complications,<sup>37</sup> and result in readmissions.<sup>38</sup> Therefore, our findings provide background health services data for future research or quality improvement initiatives investigating whether providing ambulatory MH services integrated with physical health care can prevent general health hospitalizations. Future research to investigate whether the costs of additional ambulatory services are offset by reductions in hospitalizations and ED visits could inform patient-centered care models designed to keep children safely at home and out of the ED and hospital.

In order to achieve integration of MH and medical care across service settings, interdisciplinary workforce development is required. First, creative solutions to address the longstanding MH workforce shortage<sup>39</sup> are needed. Pipeline programs to incentivize training in child and adolescent MH disciplines will help build the necessary workforce to support better MH services integration. Nurse practitioner, physician assistant, and social work training programs may be well positioned for rapid workforce development, since these programs require a shorter training period and less financial investment from students than most medical and psychology doctorate training programs. Second, medical clinicians require better training and professional development in MH care skills. These skills are not adequately taught in current pediatric medical training,<sup>40</sup> and ongoing efforts to improve MH training will help better prepare pediatric clinicians to collaborate in MH care. Interdisciplinary professional development opportunities to exchange knowledge and skills can help foster mutual understanding of each discipline's clinical approach and can foster collaboration.

Our findings should be considered in the context of this study's strengths and limitations. First, our ability to examine data from 11 state Medicaid program offers a more comprehensive look at Medicaid costs than is typically available. In order to ensure complete capture of claims, we restricted our analyses to Medicaid plans that provided both medical and behavioral health services; utilization and costs for children receiving MH and substance abuse services through carve-out arrangements or private insurance plans could differ. Second, we were only able to identify spending covered by the Medicaid plan; services paid for out-of-pocket or by other funding mechanisms, such as local governments or federal block grants are not included. Third, we categorized services delivered by clinicians whose credentials were not specified as being delivered by generalists. If any of these clinicians were, in fact, MH specialists, we may have miscategorized some MH services as being for general health and thus underestimated spending on MH services. We mitigated this limitation by also using diagnosis codes to determine which encounters included MH services. Substance abuse and suicide ideation diagnosis codes are thought to underestimate the prevalence of these disorders<sup>41</sup>; thus, we likely underestimate the prevalence of substance abuse and suicide ideation in young people using Medicaid. Certain medications with multiple indications (antiepileptic drugs, benzodiazepines, and clonidine) were classified as general medications; therefore, we underestimate utilization of these medications for MH indications. In spite of these limitations, the present analyses provide an overview of health services use for children with MH conditions enrolled in Medicaid.

## CONCLUSIONS

In this sample of children from 11 states using Medicaid in 2016, the highest-spending patients with MH conditions were more likely to have multiple MH conditions and chronic and complex physical health conditions. Drivers of high spending among children with MH conditions included inpatient hospitalizations for physical or MH reasons. Reducing hospitalizations is a target area to reduce overall costs. Future research and quality initiatives to determine whether increased ambulatory services can lead to fewer hospitalizations could inform the design of patient-centered care models and inform strategies to reduce costs.

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**Authorship statement:** Dr Douplik led the study design, interpreted the data, drafted the initial manuscript, revised the manuscript for key intellectual content, and approved the final manuscript. Mr Rodean performed the data analysis and participated in the design of the study, interpretation of the data, revised the manuscript for key intellectual content, and approved the final manuscript. Dr Hall provided statistical consultation and participated in the design of the study, interpretation of the data, revised the manuscript for key intellectual content, and approved the final manuscript. Drs Feinstein, Gay, Bettenhausen, Markham, Simmons, Zima, and Berry participated in the design of the study, interpretation of the data, revised the manuscript for key intellectual content, and approved the final manuscript.

## SUPPLEMENTARY DATA

Supplementary data related to this article can be found online at <https://doi.org/10.1016/j.acap.2020.01.013>.

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