Behavioral Health Diagnoses Among Children and Adolescents Hospitalized in the United States: Observations and Implications

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Objective: The study described rates and characteristics of U.S. children hospitalized with a behavioral (mental or substance use) disorder.

Methods: This cross-sectional analysis of data from the 2012 Kids' Inpatient Database included 483,281 hospitalizations in general and children's hospitals of persons under age 21 with a primary or secondary behavioral diagnosis.

Results: The admission rate with any behavioral diagnosis was 5.5 per 1,000 children in the U.S. population, with 2.9 having a primary behavioral diagnosis. Common primary diagnoses included depression (34%), other mood (31%), psychotic (9%), and substance use (7%) disorders. The most common behavioral diagnoses secondary to a primary diagnosis that is not behavioral were depression (26%), attention-deficit disorder (26%), and substance use disorders (22%). Suicide or self-harm was rarely the primary diagnosis (.1%) but complicated 12% of admissions with a primary behavioral diagnosis. Variations in admissions (per 1,000 children in the U.S. population) with a primary behavioral diagnosis were noted by race-ethnicity (blacks, 3.2; whites, 2.9; and Hispanics, 1.4), insurance (public, 2.9; private, 2.0), and geographic region. Fifty-nine of every 1,000 peripartum admissions in the 12–20 age group had a secondary behavioral diagnosis. Patients with behavioral comorbidities were more likely to be transferred to another facility (8.0% versus 2.2%, $p<.001$). Behavioral disorders comorbid to nonbehavioral disorders increased length of stay (4.3 versus 3.3 days, $p<.001$) and costs ($12,742 versus $9,929, $p<.001$).

Conclusions: Nearly 500,000 pediatric admissions in 2012 included behavioral disorders. Comorbidities were associated with longer stays and an estimated $1.36 billion additional annual costs, which were disproportionately borne by public insurance.

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Mental and substance use disorders (behavioral disorders) affect 13%–20% of children and adolescents in the United States (1). Studies indicate that 3%–10% of hospital discharges are for children with a primary diagnosis of a behavioral disorder and that these conditions were among the top five most costly conditions for children ages 17 or younger in 2012 (2–4). Such findings underestimate the full extent of behavioral disorders among hospitalized children because they omit disorders that are comorbid to other primary diagnoses. In contrast, this article provides nationally representative estimates of hospitalizations for children under age 21 in general and children's hospitals with any behavioral health diagnosis, which we refer to herein as behavioral disorders or diagnoses. By considering secondary diagnoses of behavioral disorders, this study offered a more accurate picture of behavioral health services for hospitalized children (3,5–7). We recognize the biological origins of behavioral disorders; in this article we favor parsimonious language over precision and adopt the imperfectly contrasted "other" or "physical health" diagnosis to juxtapose with behavioral diagnoses.

We sought to enhance the understanding of the use of behavioral health services for children hospitalized in general and pediatric hospitals in the United States. Retrospective analysis of nationally representative data allowed us to estimate the rates of hospitalizations per capita—that is, the rates per person in the specified population. We looked at children and young adults with a behavioral disorder as a primary or secondary diagnosis and describe systematic variations in these rates by age, race-ethnicity, hospital characteristics, insurance status, and geographic region and estimate additional costs and length of stay when behavioral disorders are comorbid with other primary diagnoses.

METHODS

We analyzed the 2012 Kids' Inpatient Database (KID), part of the Agency for Healthcare Research and Quality's (AHRQ's) Healthcare Cost and Utilization (HCUP) project. KID data includes a random sample of 10% of uncomplicated births and 80% of all other pediatric discharges from

sampled hospitals in 48 states. KID is designed to produce the most valid and precise estimate of national hospitalizations of U.S. children from birth to age 20 admitted to nonfederal general and children's hospitals, with use of sampling weights that incorporate hospital characteristics from the American Hospital Association database (4,8). KID includes the principal diagnosis and up to 24 secondary diagnoses, 15 procedure codes, admission and discharge status, patient demographic characteristics, and other characteristics, such as charges and length of stay (4). We used a cost-to-charge ratio provided by HCUP to transform charges into cost. The 2012 U.S. Census data provided denominators for the population (per capita) rates (9). Kaiser Family Foundation data permitted us to provide national estimates of insurance status by age, supporting population-based estimates of hospitalization by insurance status (10). *ICD-9-CM* codes were used for calendar year 2012, and all diagnosis data were based on these codes. The first diagnosis was considered primary, and all subsequent diagnoses were considered secondary. [A table showing diagnostic classifications by *ICD-9-CM* codes is included in an online supplement to this article.] We developed the classification scheme from previously published algorithms (3,11) slightly modified for this study as a result of a supplemental review of diagnosis codes for pediatric hospitalizations. All other diagnoses were considered to be other (nonbehavioral) diagnoses. We used a standard algorithm from the Centers for Disease Control and Prevention to identify admissions for childbirth (12).

We analyzed all hospital discharge records of patients ages 0–20 with primary or secondary diagnoses classified as a behavioral disorder, which we sorted into 12 diagnostic categories, with suicide attempts treated as a distinct category [see table in online supplement]. This study was exempted from institutional review board approval and informed consent.

Using standard methods and SAS 9.4, we conducted univariate and bivariate analyses to describe the sample and chi-square tests to compare across categories accounting for sampling weights (13). Proc SurveyLogistic was used to examine racial-ethnic differences after adjustment for the indicated variables.

All numerators were from KID data. Denominators for estimating population rates came from the 2012 U.S. Census estimates, including specified subgroups (age, sex, and race-ethnicity), supplemented by Kaiser Family Foundation data regarding insurance status (10). The denominator to calculate the rates of behavioral diagnoses of peripartum psychiatric disorders per delivery was the number of admissions for childbirth for women ages 12–20 (12).

The study's unit of analysis was a hospitalization. KID lacks individual identifiers that would allow for analysis by individual, linkages among episodes of care, or determination of whether a hospitalization is a readmission or a transfer.

We estimated differences in cost and length of stay associated with behavioral disorders in the population (ages six to 18) admitted with physical health diagnosis. We enhanced our control of confounding by using propensity score analysis (14,15) to compare these discharges with and without a diagnosis of a behavioral disorder, after adjusting for other covariates: age, gender, race-ethnicity, and diverse clinical variables, including the clinical nature of the primary diagnosis (for which we used categories defined in AHRQ's clinical classification software) (16). Propensity analysis was confirmed by using standard practices (17,18). [Details of the propensity analysis are available in the online supplement.] All statistical tests reported were two-tailed, with a predetermined level of significance of $p<.05$.

To improve our comparison of like to like, the analysis included only children discharged home. Our rationale was that hospitalizations resulting in transfer would have underestimated the cost of care (because a transfer will look like a discharge). Furthermore, we expected that patients with primary physical health and comorbid behavioral disorders would be more likely to require transfer to a facility better equipped to handle the behavioral disorders; therefore, the exclusion of these admissions likely biased our findings toward the null, meaning that our estimates are conservative. By not including admissions that resulted in transfer, we likely provide a low estimate of the excess length of stay and cost for children with primary general medical and comorbid behavioral disorders.

RESULTS

There were 6,675,222 pediatric discharges from general or children's hospitals in 2012: 7.3% had either a primary behavioral diagnosis (253,984 hospitalizations, 3.8%) or a comorbid behavioral disorder diagnosis (228,854 hospitalizations, 3.4%) (Table 1). The rates per 1,000 children ages 0–20 in the U.S. population were 2.9 for hospitalizations with a primary behavioral diagnosis, 2.6 for hospitalizations with a secondary (only) behavioral disorder diagnosis, and 5.5 for hospitalizations with any listed (primary or secondary) behavioral disorder diagnosis. Children under age five constituted a distinct subgroup, including 4,354 admissions for neonatal addiction (three of every 1,000 children ages 0–5 in the U.S. population).

Depression (34%) and other mood disorders (31%) were the most common primary behavioral diagnoses, followed by psychotic disorders (9%) and substance use disorders (7%). The most frequent behavioral diagnoses that were not in the primary diagnosis position (that is, comorbid with a primary diagnosis of another physical health condition) were depression (26%), attention-deficit disorder (ADD) (26%), and substance use disorders (22%). Almost no children were admitted with a primary diagnosis of suicidal ideation or self-injury (.1%); suicidal ideation or self-injury was usually coded as the secondary diagnoses (12% of all discharges with a comorbid behavioral disorder diagnosis) (Table 1). The most common primary diagnosis among patients discharged with a diagnostic category of suicidal ideation or self-injury was poisoning by analgesics.

TABLE 1. Characteristics of pediatric hospitalizations with a primary, secondary, or primary or secondary behavioral diagnosis

	Primary behavioral diagnosis			Secondary behavioral diagnosis			Primary or secondary behavioral diagnosis		
Characteristic	N	%	Per 1,000 capita[a]	N	%	Per 1,000 capita[a]	N	%	Per 1,000 capita[a]
Hospitalizations	253,984	100	2.92	228,854	100	2.63	483,281	100	5.55
Age (M±SD)	15.8±4.1			15.2±5.5			15.5±4.8		
Age group									
0–5	2,074	1	.09	11,314	5	.47	13,422	3	.56
6–11	25,345	10	1.03	33,641	15	1.37	58,986	12	2.40
12–18	156,311	62	5.31	111,744	49	3.80	268,055	55	9.11
19–20	66,446	26	7.41	70,263	15	7.84	136,709	12	15.25
Missing	3,808	2		1,892	.8		6,109	1	
Sex									
Female	130,595	51	3.07	120,790	53	2.84	251,560	52	5.92
Male	123,389	49	2.77	108,064	47	2.43	231,721	48	5.20
Race-ethnicity									
Asian	3,348	1	.73	3,164	1	.69	6,516	1	1.42
Black	42,540	17	3.20	35,634	16	2.68	78,204	16	5.88
Hispanic	28,958	17	1.42	29,791	13	1.46	58,857	12	2.89
White	138,517	55	2.89	129,792	57	2.71	268,580	56	5.61
Other	109,73	4		9,117	4		24,422	5	
Missing	27,472	11		19,224	8		46,703	10	
Insurance									
Private	112,045	44	1.97[b]	96,168	42	1.65[b]	208,451	43	3.63[b]
Public	113,124	44	2.94[b]	108,096	47	2.52[b]	221,321	46	5.47[b]
Uninsured	13,678	5	.97[b]	12,504	5	.74[b]	26,257	5	1.72[b]
Other	15,136	6		11,561	5		25,997	5	
Psychiatric diagnosis									
Attention-deficit disorder	5,659	2	.07	59,506	26	.68	117,458	24	1.35
Anxiety disorder	11,183	4	.13	52,307	23	.60	106,465	22	1.22
Depression	86,853	34	1.00	59,810	26	.69	166,466	34	1.91
Other mood disorder	78,246	31	.90	30,285	13	.35	127,659	26	1.47
Eating disorder	3,355	1	.04	3,484	1.5	.04	11,629	2	.13
Oppositional disorder	4,369	2	.05	4,763	2	.05	36,003	7	.41
Peripartum disorder	4,479	2	9.38[c]	23,470	10	49.13[c]	28,286	6	59.21[c]
Pervasive developmental disorder	2,371	1	.03	22,590	10	.26	34,741	7	.40
Posttraumatic stress disorder	3,888	2	.04	6,445	3	.07	33,596	7	.39
Psychotic disorder	23,108	9	.27	5,212	2	.06	34,728	7	.40
Somatoform disorder	167	.1	.002	399	.2	.005	823	.2	.01
Substance use disorder[d]	17,751	7	.20	50,209	22	.58	124,118	26	1.43
Suicide or self-injury	363	.1	.004	26,647	12	.31	117,555	24	1.35
Tic disorder	422	.2	.005	1,784	.9	.02	3,668	1	.04
Other	11,859	5	.14	18,164	8	.21	76,794	16	.88

[a] Per 1,000 persons age ≤20 in the U.S. population, unless otherwise indicated
[b] Included only children ages 0–18
[c] Per 1,000 U.S. deliveries for females age ≤20
[d] Children under age six not included

As expected, hospitalizations varied by age groups (Table 1). Admissions for primary behavioral diagnoses occurred at a rate (per 1,000 children in the U.S. population) of .09 for children ages zero to five, 1.03 for those ages six to 11, 5.31 for those ages 12–18, and 7.41 for those ages 19–20 ($p<.001$). Adding secondary behavioral disorder diagnoses increased the rates per 1,000 to .56, 2.04, 9.11, and 15.25 admissions, respectively ($p<.001$).

Other mood disorder was the most common (39%) primary behavioral diagnosis for children ages six to 11 (Table 2). Depression was most common for those ages 12–18 (41%) and those ages 19–20 (28%). Substance use disorder diagnoses peaked at 27.7% of admissions with a primary diagnosis of a behavioral disorder for those age 20; substance use disorder is uncommon before adolescence. Notably, three of four admissions with a primary diagnosis of a behavioral disorder for children ages zero to five (and 96.2% of children admitted before age one) were infants with neonatal addiction.

Peripartum psychiatric disorders among teenage mothers bear scrutiny. Nine of every 1,000 admissions for delivery among females ages 12–20 were for a primary diagnosis of a behavioral disorder and 59 of every 1,000 admissions for delivery among females in this age group had one or more

TABLE 2. Hospitalizations among patients with a primary or secondary behavioral diagnosis, by age group

	Ages 0–5			Ages 6–11			Ages 12–18			Ages 19–20		
Diagnosis	N	%	Per 1,000 capita[a]	N	%	Per 1,000 capita[a]	N	%	Per 1,000 capita[a]	N	%	Per 1,000 capita[a]
Primary diagnosis												
Hospitalizations	2,074	100	.09	25,345	100	1.03	156,311	100	5.31	66,446	100	7.41
Attention-deficit disorder (ADD)	302	15	.01	2,755	11	.11	2,428	2	.08	113	.2	.01
Depression	41	2	.00	3,619	14	.15	63,408	41	2.16	18,325	28	2.04
Other mood disorder	503	24	.02	9,958	39	.41	48,276	31	1.64	17,896	27	2.00
Posttraumatic stress disorder	76	4	.00	894	4	.04	2,411	2	.08	495	1	.06
Anxiety disorder	77	4	.00	1,592	6	.06	7,034	5	.24	2,429	4	.27
Oppositional disorder	102	5	.00	1,384	5	.06	2,733	2	.09	137	.2	.02
Psychotic disorder	48	2	.00	816	3	.03	9,672	6	.33	12,165	18	1.36
Pervasive developmental disorder	167	8	.01	705	3	.03	1,248	1	.04	250	.4	.03
Somatoform disorder	0	—	.00	27	.1	.00	109	.1	.00	30	.1	.00
Eating disorder	30	2	.00	217	1	.01	2,662	2	.09	435	1	.05
Tic disorder	74	4	.00	215	1	.01	114	.1	.00	19	.03	.00
Substance use disorder	0	—	.00	122	.5	.00	7,757	5	.26	9,873	15	1.10
Suicide or self-injury	0	—	.00	41	.2	.00	250	.2	.01	70	.1	.01
Peripartum disorder	0	—	.00	0	—	.00	1,552	1	.05	2,821	4	.31
Other	657	32	.03	3,009	12	.12	6,712	4	.23	1,406	2	.16
Primary or secondary diagnosis												
Hospitalizations	13,422	100	.56	58,986	100	2.40	268,055	100	9.11	136,709	100	15.25
ADD	3,092	23	.13	32,949	56	1.34	66,211	25	2.25	14,230	10	1.59
Depression	229	2	.01	6,705	11	.27	109,376	41	3.72	47,816	35	5.33
Other mood disorder	890	7	.04	14,574	25	.59	75,383	28	2.56	34,475	25	3.84
Posttraumatic stress disorder	319	2	.01	4,360	7	.18	21,724	8	.74	6,927	5	.77
Anxiety disorder	2,525	19	.10	11,330	19	.46	62,317	23	2.12	29,384	22	3.28
Oppositional disorder	638	5	.03	9,346	16	.38	24,739	9	.84	997	1	.11
Psychotic disorder	140	1	.01	1,777	3	.07	15,466	6	.53	16,736	12	1.87
Pervasive developmental disorder	4,819	36	.20	11,150	19	.45	15,320	6	.52	3,417	3	.38
Somatoform disorder	10	.1	.00	92	.2	.00	548	.2	.02	170	.1	.02
Eating disorder	507	4	.02	656	1	.03	8,317	3	.28	2,083	2	.23
Tic disorder	180	1	.01	1,075	2	.04	1,948	.7	.07	454	.3	.05
Substance use disorder	0	—	.00	934	2	.04	62,811	23	2.14	60,372	44	6.73
Suicide or self-injury	212	2	.01	5,806	10	.24	78,793	29	2.68	30,489	22	3.40
Peripartum disorder	0	—	.00	0	—	.00	9,817	4	.33	17,888	13	2.00
Other	3,099	23	.13	10,766	18	.44	43,813	16	1.49	17,990	13	2.01

[a] Per 1,000 persons age ≤20 in the U.S. population

behavioral disorders coded at discharge. The most common behavioral diagnoses for admissions for delivery in this age group were depression (24 of every 1,000 admissions) and substance use disorders (23 of every 1,000).

Psychiatric hospitalizations varied by race and insurance status (Table 1). Overall rates (per 1,000 children in the U.S. population) of admission with primary behavioral disorders for blacks, whites, Hispanics, and Asians were 3.20, 2.89, 1.42, and .73 ($p<.001$). For admissions with any primary or secondary behavioral diagnosis, the rates per 1,000 child population were similar: 5.88, 5.61, 2.89, and 1.42, respectively. After adjustment for patient age, sex, insurance, rural versus urban county residency, and income, black-white differences were no longer significant, with lower rates for Hispanic and Asian children, compared with white children ($p<.001$).

Regarding insurance status, admissions with a primary behavioral diagnosis or admissions with any behavioral diagnosis were most common for children with public insurance (2.94 and 5.47 per 1,000 children in the population, respectively), compared with admissions of privately insured children (1.97 and 3.63 per 1,000, respectively) and admissions of uninsured children (.97 and 1.72 per 1,000) ($p<.001$ for both primary and secondary behavioral diagnoses) (Table 1).

TABLE 3. Nonbehavioral primary discharge diagnoses most frequently associated with hospitalizations of children with a secondary behavioral diagnosis[a]

Behavioral and nonbehavioral diagnoses	Hospitalizations (N=145,385)[b]	
	N	%
Attention-deficit disorder	49,006	34
Epilepsy	3,065	6
Asthma	5,804	12
Depression	35,711	25
Poisoning by analgesics	3,652	10
Poisoning by psychotropic agent	3,345	9
Anxiety disorder	33,156	23
General symptoms	1,653	5
Chemotherapy	1,392	4
Substance use disorder	21,693	15
Poisoning by psychotropic agent	2,197	10
Other mood disorder	18,450	13
Poisoning by psychotropic agent	1,669	9
Suicide or self-injury	18,082	12
Poisoning by analgesics	5,512	31
Pervasive developmental disorder	16,312	11
Poisoning by psychotropic agent	4,789	27
Other	11,717	8
Epilepsy	1,186	10
Peripartum disorder	8,176	6
Trauma during delivery	1,122	14
Other condition of mother complicating pregnancy	1,027	13
Posttraumatic stress disorder	4,296	3
Poisoning by psychotropic agent	402	9
Poisoning by analgesics	298	7
Oppositional disorder	4,200	3
Diabetes	338	8
Poisoning by psychotropic	324	8
Psychotic disorder	2,689	2
Poisoning by psychotropic agent	277	10
Eating disorder	2,291	2
Disorder of fluid electrolyte	231	10
Cardiac dysrhythmia	223	10
Tic disorder	1,462	1
Epilepsy	159	11
General symptoms[c]	134	9
Somatoform disorder	295	.2
General symptoms	32	11

[a] Data are for hospitalizations of children ages 6–18.
[b] Denominator for nonbehavioral primary discharge diagnoses is the number of hospitalizations of children ages six to 18 with the indicated secondary behavioral diagnosis.
[c] Identified with *ICD-9-CM* codes 780.XX

Children admitted with a primary or secondary behavioral diagnosis often had more than one behavioral diagnosis. For example, among children admitted with a primary diagnosis of ADD, 43% had comorbid oppositional disorders; among those admitted with a primary diagnosis of depression, 53% had a secondary diagnosis of self-injury or suicidal ideation. Other mood disorders were comorbid with suicide or self-injury (35%) or substance use disorders (26%), and discharges for posttraumatic stress disorder also had a high rate of suicide or self-injury diagnoses (40%) [see online supplement].

Behavioral disorders were also common secondary diagnoses among children admitted with other primary diagnoses. Table 3 shows the most frequent behavioral comorbidities for children ages six to 18 who were admitted for specific primary diagnoses that are not behavioral. [A table in the online supplement shows the most frequent primary diagnoses that are not behavioral and the most commonly associated behavioral disorders.] Poisoning and epilepsy were the most common physical diagnoses associated with a comorbid behavioral diagnosis (8.5% and 5.3%, respectively, of all hospitalizations with the specified primary diagnosis).

The most common behavioral diagnoses for children hospitalized with other nonbehavioral primary diagnoses were ADD (34%), depression (25%), and anxiety (23%) (Table 3). ADD was most frequently comorbid with epilepsy and asthma. Almost one in five hospitalizations for a physical diagnosis in which depression was a secondary diagnosis was for poisoning (10% by analgesics and 9% by psychotropic agents). Four percent of children with a secondary diagnosis of anxiety were admitted for chemotherapy, and five percent were admitted for general symptoms without a more specific principal diagnosis.

We observed substantial variation in hospitalizations for a primary behavioral diagnosis by hospital size, ownership, location, and teaching status (Table 4). Rates per 100 hospitalizations were higher in large versus small, urban teaching versus rural, and governmental versus private hospitals. Rates of hospitalization (per 1,000 children in the population) for children with a behavioral diagnosis were highest in the West North Central census division (5.2 for hospitalizations with a primary behavioral diagnosis and 8.5 for hospitalization with either a primary or secondary behavioral diagnosis) and lowest in the Pacific census division (1.6 and 3.7, respectively).

Among children admitted with a primary general medical diagnosis, the presence of a behavioral diagnosis was associated with a longer stay, from 3.3 to 4.3 days, and higher costs (mean=$2,813; median=$565; all comparisons $p<.001$) (Table 5). As predicted, children with behavioral diagnoses were more likely to be transferred to other health care facilities, compared with those who did not have behavioral comorbidity (8.0% versus 2.2%, $p<.001$).

DISCUSSION

This study found that children were commonly admitted to general and children's hospitals for a primary diagnosis of a behavioral disorder. Management of such disorders for children in general and children's hospitals is nearly twice as common when psychiatric comorbidity is taken into account and approaches half a million hospitalizations each year. Study of those with both primary and secondary behavioral

health diagnoses led to several anticipated and unanticipated findings.

Children hospitalized for primary diagnoses other than behavioral disorders have longer lengths of stay and higher costs if they have any behavioral comorbidity. These results improve on previous findings (4) by reporting not charges but costs, by propensity matching the hospitalizations with and without behavioral disorders, and by improving the like-to-like comparison by including only hospitalizations for children discharged home (7). Considering our mean estimate of the difference in costs ($2,813) and the number of discharges home of children with comorbid behavioral conditions, the total additional cost in 2012 associated with managing psychiatric comorbidities among hospitalized children was $1.36 billion, not including the unmeasured excess costs for hospitalizations that resulted in transfer to other health care facilities. Our findings may be analogous to findings of higher costs among adults with cardiac diseases complicated by depressive disorders (19).

Behavioral disorders were frequently comorbid with one another. Prior studies that examined comorbidity have typically focused on anticipated combinations (for example, posttraumatic stress disorder and depression, anxiety, or substance use disorders [20]). Our findings extend those from previous studies (3–5,13) by providing empirical estimates of the spectrum of comorbid behavioral disorders, regardless of primary diagnosis. Our findings, such as suicidality comorbid with other mood disorders and posttraumatic stress disorder and anxiety comorbid with cancer chemotherapy, should stimulate innovative clinical investigation. The frequency with which both medical and behavioral health

TABLE 4. Characteristics of hospitals where pediatric patients with primary, secondary, or any (primary or secondary) behavioral diagnoses were hospitalized

	Primary behavioral diagnosis (N=253,984)				Secondary behavioral diagnosis (N=228,854)				Any primary or secondary behavioral diagnosis (N=483,281)			
Characteristic	N	%	Per 100 hospitalizations[a]	Per 1,000 capita[b]	N	%	Per 100 hospitalizations[a]	Per 1,000 capita[b]	N	%	Per 100 hospitalizations[a]	Per 1,000 Capita[b]
Size												
Small	23,264	9	3.2		23,449	10	3.2		46,747	10	6.4	
Medium	55,261	22	3.3		50,977	22	3.1		106,344	22	6.5	
Large	175,459	69	4.1		154,428	67	3.6		330,190	68	7.7	
Hospital census division												
New England	12,847	6	5.4	3.43	10,255	4	4.3	2.74	23,103	5	9.7	6.16
Middle Atlantic	41,120	16	4.6	3.82	33,354	15	3.7	3.10	74,484	15	8.4	6.92
East North Central	48,150	19	5.0	3.73	39,861	17	4.1	3.09	88,019	18	9.1	6.82
West North Central	30,339	12	6.3	5.18	19,709	9	4.1	3.36	50,051	10	10.4	8.54
South Atlantic	53,717	31	4.0	3.30	45,278	20	3.4	2.78	98,999	20	7.4	6.08
East South Central	9,028	4	3.7	1.75	8,568	4	3.5	1.66	17,598	4	7.2	3.42
West South Central	25,388	10	2.6	2.23	24,703	11	2.5	2.17	50,501	10	5.1	4.44
Mountain	10,982	4	2.3	1.66	16,096	7	3.4	2.43	27,081	6	5.8	4.08
Pacific	22,413	9	2.1	1.56	31,029	14	2.9	2.16	53,445	11	5.0	3.73
Hospital control												
Government	36,559	14	4.1		29,973	13	3.4		66,564	14	7.5	
Private, not for profit	182,857	72	3.7		177,784	78	3.6		360,901	75	7.4	
Private, investor owned	34,568	14	3.8		21,098	9	2.3		55,816	12	6.2	
Hospital location and teaching status												
Rural	19,283	8	2.7		17,071	7	2.4		36,357	8	5.1	
Urban nonteaching	80,344	32	3.8		47,665	21	2.2		128,211	27	6.0	
Urban teaching	154,356	61	4.0		164,119	72	4.3		318,714	66	8.3	

[a] Per 100 hospitalizations of patients ages ≤20 (calculated from data in the KID 2012 database)
[b] Per 1,000 persons age ≤20 in the U.S. population

TABLE 5. Length of stay and costs of pediatric hospitalizations with and without behavioral diagnoses for patients discharged home[a]

Variable	Without behavioral diagnoses	With behavioral diagnoses	p
Length of stay (days)			
M±SD	3.3±5.9	4.3±8.9	<.001
Median	2	2	
IQR[b]	1–4	1–4	
Cost			
M±SD	$9,929±22,919	$12,742±38,490	<.001
Median	$5,143	$5,708	
IQR[b]	$2,910–$9,853	$3,163–$11,254	

[a] Propensity score–matched cohorts; p value based on Wilcoxon rank sum test
[b] Interquartile range

diagnoses co-occurred for a hospitalization suggests a benefit to considering how integrated care might best be delivered in the inpatient setting.

The rate of hospitalizations (per 1,000 children in the population) with a primary or secondary behavioral diagnosis was nearly 50% higher among children with public insurance compared with those with private insurance. Competing and complementary hypotheses could explain our finding. Eligibility for Medicaid is associated with a range of adverse social factors including poverty, single-parent families, and other stresses. For example, the most disabled children covered by Medicaid may receive Supplemental Security Income, and this population generally has higher inpatient utilization than other children (21). Perhaps publicly insured families have less access to resources and support networks that would enable use of alternatives to hospitalization. Alternatively, literature on the effects of biological stress (22,23), toxic stress (24), and other social determinants on health and disease would support poverty as a contributing factor to a higher incidence and prevalence of behavioral health disorders in the lower income population served by Medicaid. In addition, the relative financial advantage of patients with private insurance may result in distinct or even adverse outcomes: stigma, tougher preauthorization screening in order to be hospitalized, or clinician styles that favor other diagnoses over behavioral disorders. Children with private insurance may have better access to psychiatric hospitals that are not included in the KID database. Finally, differential access to medications, outpatient treatment, or day treatment centers might contribute to the large differences that we observed. Given that so large a proportion of U.S. children have public insurance, these differences raise critical questions to consider and address as we design accountable health care for children in this era of transformation. Children with no insurance appeared to be at a disadvantage regarding behavioral health care, and their low rate of admission is disturbing.

One implication of our findings is that there is a disparate financial burden for inpatient mental health care on public insurers compared with private insurers. Behavioral health care was found to be more likely to be provided in public than in private hospitals.

Threefold variations across U.S. Census regions were seen in rates of admissions for primary behavioral diagnoses, and twofold variations were evident for hospitalizations with any behavioral diagnosis. Geographic variation in health services utilization and quality have been well studied for general medical conditions among adults (25) but less so for adults with behavioral disorders (26) and even less for children with behavioral disorders (27,28). Culture and demography may contribute but do not appear sufficient to explain the observed geographic differences. Infrastructure differences in ambulatory care, insurance policies, practice patterns, and availability of beds in psychiatric units and hospitals could be contributing factors and need to be studied.

Behavioral diagnoses were disproportionately prevalent among girls and young women during pregnancy, and pregnant adolescents constituted a substantial proportion of adolescents admitted with any psychiatric diagnosis. Psychiatric hospitalizations for girls and young women admitted for pregnancy, delivery, or postpartum care was 6% of hospitalizations with any behavioral disorder diagnosis, and behavioral disorders were present for 59 of every 1,000 children in the population hospitalized for delivery. This finding underlines the importance of looking beyond principal diagnosis when studying behavioral disorders among children, adolescents, and young adults. There are plausible arguments that psychiatric conditions may constitute a risk of unintended pregnancy. For some adolescents and young women, pregnancy may represent a stressor that leads to a behavioral disorder. We hope that these findings will lead to enhanced resources in services for these adolescents and young women and for research to identify opportunities to reduce psychiatric morbidity among adolescents and neonatal addiction syndrome among their offspring.

The extent and increasing incidence of neonatal addiction are of concern (29–31). Children who are exposed to opioids in utero are at risk of adverse developmental, behavioral health, and educational outcomes (31–33). Because of the widely reported increases in the use of opioids among young people (34), we may anticipate an array of future adverse consequences.

Self-harm was rarely a principal diagnosis for admission in this study, and this finding provides new insights into the extent to which suicidality and self-harm are a part of pediatric hospitalization. About 24% of admissions with a primary or secondary behavioral diagnosis were complicated by suicidality or self-harm. Many such admissions are for treatment of the physical harm caused by an overdose of medication, and other admissions were for a primary psychiatric diagnosis, such as depression or posttraumatic stress. If we seek to use hospitalization as a lens for understanding the impact of suicidality among children and adolescents, it is imperative that future studies consider both primary and secondary diagnoses.

The study had some limitations. The KID database provides nationally representative estimates and was developed

for research purposes. As is typical, it lacks individual identifiers, and we had to rely on the codes as recorded. Although *ICD-9* codes are recorded by professional abstracters on the basis of clinical information entered in the medical charts and billing incentives typically favor including all diagnoses addressed during the hospitalization, we recognize that coding errors are inevitable. We have no reason to expect specific biases in the data coding that would disrupt our findings. The KID database lacks data from freestanding psychiatric hospitals and federal hospitals and thus underestimates the total frequency and cost of behavioral diagnoses in children. The database did not allow us to differentiate admissions to general hospitals from those to psychiatric units within the sampled hospitals.

CONCLUSIONS

Pediatric hospitalizations of children with behavioral disorders to general and children's hospitals in the United States approached half a million in 2012. The study found that behavioral disorders were common among children admitted for other physical conditions and yielded additional costs of over $1.36 billion per year to these admissions. Behavioral disorders were found to frequently complicate adolescent and young adult pregnancy. Suicide or self-harm was rarely a primary diagnosis for admission; however, children with this diagnosis constituted 24% of all pediatric admissions with a behavioral disorder. The primary diagnosis for admitting children with suicide or self-harm was frequently to treat physical symptoms resulting from self-harm. If they are to yield the kind of information that can improve outcomes for this vulnerable population, studies of inpatient behavioral health care for children and adolescents will need to consider all admissions with primary behavioral diagnoses, as well as hospitalization in which behavioral disorders are secondary to other primary diagnoses.

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Submissions Invited for Culture & Mental Health Services Column

A new column in *Psychiatric Services,* Culture & Mental Health Services, edited by Roberto Lewis-Fernández, M.D., aims to clarify the ways that culture shapes the utilization, delivery, and organization of mental health services. Submissions may examine the influence of culture at the level of the individual seeking care (e.g., the impact of a person's cultural views of illness on treatment choice and level of engagement), the provider (e.g., the role of implicit racial-ethnic biases on service recommendations), the program (e.g., how local socioeconomic and organizational factors influence the package of services offered at a clinic), or the mental health system (e.g., how political forces affect reimbursement structures that determine availability of services). Dr. Lewis-Fernández welcomes papers that focus on aspects of culture related to interpretation (meaning making), social group identity (e.g., race-ethnicity, language, and sexual orientation), and social structures and systems. The goal of the column is to make visible the social-contextual frameworks that shape care. Papers, limited to 2,400 words, may be submitted online as columns via ScholarOne Manuscripts at mc.manuscriptcentral.com/appi-ps. The cover letter should specify that the submission is for the Culture & Mental Health Services column.