






Factors Associated With Child and Youth Mental Health Readmissions From a US National Database

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Objective: To describe and identify factors associated with mental health (MH) readmission rates for youth ages 5 to 17 years discharged between January 2019 and November 2019.

Method: This retrospective, cross-sectional analysis using the 2019 Nationwide Readmissions Database identified hospitalizations for patients with a primary diagnosis of an MH condition using the Clinical Classification Software groupings, which are based on *ICD-10-CM* codes. Various patient characteristics including comorbidities were included in univariate and multivariate analysis to study their association with psychiatric readmission.



Results: A 30-day readmission rate of 7.8% was found for the overall sample with significantly higher rates for youth younger than age 15 years. MH comorbidity was a factor in readmission rates; having ≥ 3 primary MH conditions was associated with higher rates of readmission (adjusted odds ratio [aOR] = 1.20). Significantly higher rates of readmission were noted for several diagnostic groupings including schizophrenia spectrum and other psychotic disorders (aOR = 1.95); bipolar and related disorders (aOR = 1.42); other specified and unspecified mood disorders (aOR = 1.42); disruptive, impulse-control, and conduct disorders (aOR = 1.32); and neurodevelopmental disorders (aOR = 1.23). Having public insurance (aOR=1.28) and a longer length of stay (AOR = 1.71 for ≥ 15 days) were associated with significantly higher odds of an MH readmission.

Conclusion: A concerning number of children admitted for MH conditions in 2019 were readmitted within 30 days (7.8%). Younger children, children with specific MH diagnoses, children with public health insurance, and children with a long initial length of stay have higher odds for readmission and represent a target for prevention and intervention.

Plain language summary: Hospital readmissions for mental health may reflect healthcare quality. This study examined data from the National Readmission Database in patients 5 to 17 years old with a primary diagnosis of a mental health condition in order to identify factors associated with readmissions. Results showed that 7.8% of youth were readmitted to the hospital within 30 days. A higher number of co-occurring primary mental health conditions, certain diagnostic groups, those with longer initial lengths of stay, and public insurance were associated with higher odds of readmission. These factors represent important targets for prevention and intervention.

Diversity & Inclusion Statement: We worked to ensure that the study questionnaires were prepared in an inclusive way. Diverse cell lines and/or genomic datasets were not available. One or more of the authors of this paper self-identifies as a member of one or more historically underrepresented racial and/or ethnic groups in science. One or more of the authors of this paper self-identifies as a member of one or more historically underrepresented sexual and/or gender groups in science.

Key words: inpatient; pediatric mental health; readmissions

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A national state of emergency has been declared by the American Academy of Child and Adolescent Psychiatry (AACAP) and other national organizations in response to the rapidly growing rates of psychiatric hospitalizations and emergency department visits.¹ As the demand for mental health (MH) care increases, capacity and access to MH beds in psychiatric units decrease.² Therefore, it is necessary to identify factors associated with increased utilization of MH services. One such factor is increasing rates of readmissions for youth related to MH reasons. Readmissions not only contribute to increasing rates of hospitalizations and saturated emergency departments, but also are

associated with increased health care costs and financial burdens.³ Youth who have experienced psychiatric hospitalization have been shown to have higher rates of emotional distress and poor educational outcomes as well as higher rates of death.⁴ Families report increased burden with moderate to severe MH problems,⁵ and it is to be expected that these burdens would be greater for families with youth with repeated psychiatric hospitalizations.⁶ These factors may increase the stress within the family and may further exacerbate the child's MH problems.

While it is true that relapses in MH are at times unavoidable and will inevitably lead to hospital readmissions,

rates of 30-day readmissions for youth have been found to be as high as 10% to 14%.⁷ Currently, a significant amount of research associated with MH readmission rates pertains to the adult population.^{8–10} In adults, it has been found that diagnosis, age at first admission, number of previous admissions, unemployment, noncompliance, and substance use have associations with increased rates of readmission.¹¹

Research on readmissions related to child and adolescent MH conditions involves single hospitals or systems. Factors such as clinical severity, length of stay (LOS), and follow-up have been associated with readmission.^{7,12,13} Findings from 2 systematic reviews suggest that greater clinical severity; longer LOS; and specific diagnoses, such as psychosis, affective disorders, and suicidal behavior, are associated with an increased risk of readmission.^{14,15} However, systematic reviews are limited by methodological heterogeneity including study population and definitions.

These limitations can be addressed by using the Agency for Healthcare Research and Quality (AHRQ) all-payer Nationwide Readmissions Database (NRD) to capture data on readmissions from 18 million discharges each year and inform decision making at the national, state, and community levels.¹⁶ The 2014 NRD was used in 2 previous studies to evaluate 30-day psychiatric readmissions,^{17,18} but much has changed in pediatric MH prevalence and care since 2014. Rates of childhood mental illness and suicide rose between 2010 and 2020, and since the COVID-19 pandemic more hospitalizations for suicide attempts or self-injury have been reported.^{1,19}

The aim of this study was to replicate and extend previous studies of child and adolescent MH readmissions using data from the 2019 NRD to guide policy and practice change. These include factors such as sex, age, LOS during prior hospitalization, noncompliance, and limited access to outpatient treatment. Newer findings will continue to guide the creation of policies and guidelines, and improving access to resources may prevent further increasing MH readmission rates in the future.

METHOD

Study Design and Data Source

We conducted a retrospective, cross-sectional analysis using the 2019 NRD, derived from the Health Care Utilization Project (HCUP) State Inpatient Databases sponsored by the AHRQ.¹⁶ The NRD is one of the largest publicly available all-payer databases in the United States and includes admission information for community hospitals, but not rehabilitation and long-term acute care hospitals. The 2019 NRD was constructed from 30 states representing approximately 60.4% of all US hospitalizations. The NRD is weighted to provide national estimates of readmissions for

all US hospitalizations and contains verified patient linkage numbers that can be used to track a patient across hospitals within a state. However, the patient linkage numbers do not track the same patient from one year to another.

Study Population

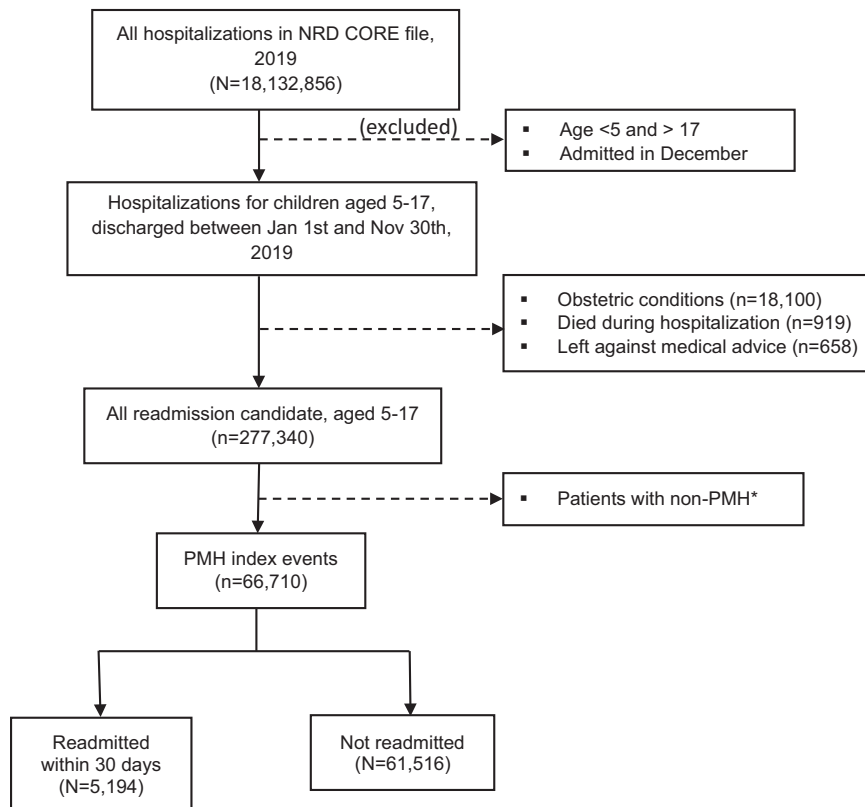
Unweighted, the NRD contains data for about 18 million discharges in 2019; weighted, it estimates about 35 million discharges. We included children ages 5 to 17 years who were discharged between January 1, 2019, and November 30, 2019 ($n = 297,132$; 1.6%). Additionally, patients were excluded if they had records related to obstetric conditions ($n = 18,100$; 6.1%) because obstetric and maternity care does not fall within the specialty of pediatric providers (Table S1, available online), if they left against medical advice ($n = 658$; 0.2%), or if they died during hospitalization ($n = 919$; 0.3%) (Figure 1).

We identified hospitalizations for patients with a primary diagnosis of an MH condition using the Clinical Classification Software groupings, which are based on *ICD-10-CM* codes.²⁰ MH conditions included schizophrenia spectrum and other psychotic disorders; depressive disorders; bipolar and related disorders; other specified and unspecified mood disorders; anxiety and fear-related disorders; obsessive-compulsive and related disorders; trauma- and stressor-related disorders; disruptive, impulse-control, and conduct disorders; personality disorders; feeding and eating disorders; somatic disorders; suicidal ideation/attempt/intentional self-harm; miscellaneous mental and behavioral disorders/conditions; neurodevelopmental disorders; and substance-related disorders (Table S2, available online).

Patient and Hospital Characteristics

Patient characteristics included age, sex, insurance type, median household income by ZIP code, weekend vs weekday admission, patient resident of the state status, patient location according to the National Center for Health Statistics (NCHS) 6 urban-rural classifications for US counties, index LOS, total charges, and comorbidities. Race was not available in the NRD dataset. Age was stratified into ranges (5–8, 9–12, 13–14, and 15–17 years). Insurance status was categorized as public, private, self-pay, none, and other. LOS was grouped as follows: 0 to 3 days, 4 to 7 days, 8 to 14 days, and 15 and more days.

Comorbidities were identified using the AHRQ Elixhauser Comorbidity Measure Refined for *ICD-10-CM* diagnosis codes.²¹ The comorbidity measure on the NRD identifies preexisting conditions that are not directly related to the reason for hospitalization and indicate a secondary diagnosis. We categorized the number of comorbid conditions into no comorbid condition, 1 comorbid condition,

FIGURE 1 Inclusion Criteria for Readmissions From National Readmission Database Core File 2019

Note: The study included children ages 5 to 17 years who were discharged between January 1, 2019, and November 30, 2019. Additionally, youth were excluded if they had records related to obstetric conditions, if they left against medical advice, or if they died during hospitalization. NRD = National Readmission Database; PMH = primary diagnosis of a mental health condition.

and 2 or more comorbid conditions. The number of MH conditions were also categorized into patients with only 1 MH, 2 MH, and 3 or more MH conditions.

Hospital characteristics, such as bed size of hospital, location (urban vs rural), teaching status of urban hospitals, total hospital discharges, urban-rural designation of hospital, and control/ownership of hospital, were also identified. Urban/rural designation is based on the county of the hospital as identified by the American Hospital Association (AHA) and categorized, based on the 2013 version of the Urban Influence Codes, into 4 broader categories: large metropolitan (at least 1 million residents), small metropolitan (<1 million residents), micropolitan, and a nonurban residual. The hospital's ownership/control category was obtained from the AHA Annual Survey of Hospitals and includes government nonfederal, private nonprofit, and private investor-owned hospitals.

Outcome Measure

The primary outcome of this study was a hospital readmission, defined as the first unplanned admission for an

MH diagnosis within 30 days of an index admission. An index admission was defined as an eligible initial admission and served as the starting point for counting readmissions. If multiple readmissions occurred within 30 days, we considered only the first readmission. All readmissions were obtained following the methodology recommended by the HCUP. We were unable to capture readmission in a different state, as a patient's hospitalizations could be linked only within one state.

Statistical Analysis

Descriptive analysis was used to summarize baseline patient and hospital characteristics. Categorical variables were reported as frequencies and percentages, and continuous variables were reported as median and 25th to 75th percentile range, all of which were non-normally distributed. To assess the difference in MH readmission rates by patient and hospital characteristics, we modeled univariate and multivariate analyses using binary logistic regression with hospital identity as a random effect and fixed effects for patient and hospital characteristics. A hospital random effect

was used to assess variation in MH readmission rates across hospitals. Characteristics associated with MH readmission with $p < .2$ in univariate analysis were entered simultaneously into a multivariate model. Odds ratio (OR) and 95% CI for readmission rates among MH conditions vs non-MH conditions were reported, and a two-sided p value $< .05$ was considered to be statistically significant. All analyses were performed using SAS software version 9.4 (SAS Institute, Cary, North Carolina).

RESULTS

Our study identified 66,710 youth ages 5 to 17 years who had MH hospitalizations for a primary diagnosis of an MH condition with 5,194 readmissions (7.8%) within 30 days of the index admission, (Figure 1, Table 1). Our index sample was 60.0% female, and the most common age range was 15 to 17 years old ($n = 33,100$, 49.6%). Slightly less than half of the sample, 47.8% ($n = 31,868$), had ≥ 2 non-MH comorbid diagnoses, and 28,005 (44.9%) had ≥ 3 MH comorbidities. The 3 most common diagnoses at index admission were depressive disorders ($n = 32,056$, 48.1%), other specified and unspecified mood disorders ($n = 9,221$, 13.8%), and trauma- and stressor-related disorders ($n = 5,391$, 8.1%).

Most of our index admissions had public insurance ($n = 37,539$, 56.3%), and LOS of the index admissions were 0 to 3 days in 26.1% ($n = 17,223$) and 4 to 7 days in 47.3% ($n = 31,243$). Most of the hospitals in the sample were described as large number of beds ($n = 45,721$, 68.5%), metropolitan teaching hospitals ($n = 57,643$, 86.4%), and within large metropolitan areas ($n = 32,558$, 48.8%).

Readmission Rates by Patient and Clinical Characteristics

Several individual characteristics were associated with rates of MH readmission rates. Male youth were found to have lower odds of MH readmission in multivariate analysis (adjusted odds ratio [aOR] = 0.92, 95% CI [0.86, 0.98]). Compared with youth ages 15 to 17 (reference group), children ages 5 to 8 had the highest rate of readmissions (10.6%, aOR = 1.60, 95% CI [1.38, 1.85]) followed by children ages 9 to 12 with a rate of 10.1% (aOR = 1.55, 95% CI [1.43, 1.68]) and children ages 13 to 14 with a rate of 8.3% (aOR = 1.32, 95% CI [1.22, 1.42]).

There was no significant difference between MH readmission rates of patients with or without medical comorbidities. However, having ≥ 3 additional MH diagnoses was associated with a higher 30-day readmission rate (8.2%, aOR = 1.20, 95% CI [1.11, 1.30]). The

following MH diagnoses were significantly associated with the risk of 30-day readmission: schizophrenia spectrum and other psychotic disorders (readmission rate 12.8%, aOR = 1.95 95% CI [1.66, 2.31]); other specified and unspecified mood disorders (readmission rate 11.6%, aOR = 1.42, 95% CI [1.30, 1.56]); obsessive-compulsive and related disorders (readmission rate 10.1%, aOR = 1.73, 95% CI [0.96, 3.13]); and disruptive, impulse-control, and conduct disorders (readmission rate 10.0%, aOR = 1.32, 95% CI [1.15, 1.51]). In addition, bipolar and related disorders had a readmission rate of 9.3% (aOR = 1.42, 95% CI [1.25, 1.62]), and neurodevelopmental disorders had a readmission rate of 9.8% (aOR = 1.23, 95% CI [1.07, 1.43]).

We found that patients with public insurance have higher rates of 30-day readmissions (8.7%) (aOR = 1.18, 95% CI [1.10, 1.27]) compared with patients with private insurance. No difference in readmission rates was noted when the index admission day was on a weekend. Higher odds of 30-day readmission rates were associated with increased LOS of the index admission. Patients with LOS of 4 to 7 days had a readmission rate of 7.2% (aOR = 1.21, 95% CI [1.11, 1.32]), patients with LOS 8 to 14 days had a readmission rate of 9.8% (aOR = 1.81, 95% CI [1.63, 2.01]), and patient with LOS ≥ 15 days had a readmission rate of 9.4% (aOR = 1.71, 95% CI [1.48, 1.96]).

Patient location by NCHS urban-rural code showed only that patients in micropolitan counties had significantly lower rates of readmission compared with patients in central counties of metropolitan areas of ≥ 1 million population (readmission rate 6.6%, aOR = 0.76, 95% CI [0.64, 0.89]). Nonresidents of the state also had significantly lower rates of readmission compared with residents (readmission rate 4.3%, aOR = 0.59, 95% CI [0.48, 0.72]). Income quartile was not found to have a significant association with 30-day readmission rates. As shown in Table 2, hospital characteristics were not significantly associated with risk of MH readmissions. There were no significant differences in readmission rates by hospital subtypes among the cohort of children with MH diagnoses that were significantly associated with higher risk of 30-day readmission (children with schizophrenia spectrum and other psychotic disorders; bipolar and related disorders; other specified and unspecified mood disorders; disruptive, impulse-control, and conduct disorders; feeding and eating disorders; and neurodevelopmental disorders) (Table 3).

DISCUSSION

This study used the HCUP NDA to analyze MH readmission rates for youth ages 5 to 17 years discharged

TABLE 1 Patient Characteristics for Children Hospitalized With a Primary Diagnosis of a Mental Health (MH) Condition

	Overall		30-day readmissions					
	n	(%)	n	Rate, %	OR	(95% CI)	aOR	(95% CI)
Total	66,710		5,194	7.8				
Sex								
Boy	26,717	(40.0)	2,178	8.2	1.05	(0.99, 1.11)	0.92	(0.86, 0.98)
Girl	39,993	(60.0)	3,016	7.5	Reference		Reference	
Age, y								
5-8	2,749	(4.1)	292	10.6	1.74	(1.52, 1.99)	1.60	(1.38, 1.85)
9-12	13,075	(19.6)	1,323	10.1	1.64	(1.52, 1.77)	1.55	(1.43, 1.68)
13-14	17,786	(26.7)	1,479	8.3	1.34	(1.25, 1.43)	1.32	(1.22, 1.42)
15-17	33,100	(49.6)	2,100	6.3	Reference		Reference	
Non-MH comorbidities								
≥2	31,868	(47.8)	2,525	7.9	0.99	(0.92, 1.06)		
1	15,697	(23.5)	1,204	7.7	0.96	(0.89, 1.04)		
None	19,145	(28.7)	1,465	7.7	Reference			
MH comorbidities								
≥3	28,005	(44.9)	2,288	8.2	1.24	(1.15, 1.34)	1.20	(1.11, 1.30)
2	20,032	(32.1)	1,508	7.5	1.09	(1.00, 1.18)	1.07	(0.98, 1.16)
1	14,330	(23.0)	1,066	7.4	Reference			
MH diagnosis								
Schizophrenia spectrum and other psychotic disorders	1,785	(2.7)	229	12.8	2.09	(1.80, 2.43)	1.95	(1.66, 2.31)
Depressive disorders	32,056	(48.1)	2,109	6.6	Reference		Reference	
Bipolar and related disorders	3,886	(5.8)	360	9.3	1.52	(1.34, 1.71)	1.42	(1.25, 1.62)
Other specified and unspecified mood disorders	9,221	(13.8)	1,071	11.6	1.69	(1.56, 1.84)	1.42	(1.30, 1.56)
Anxiety and fear-related disorders	1,294	(1.9)	69	5.3	0.77	(0.60, 0.99)	0.78	(0.60, 1.02)
Obsessive-compulsive and related disorders	129	(0.2)	13	10.1	1.57	(0.88, 2.80)	1.73	(0.96, 3.13)
Trauma- and stressor-related disorders	5,391	(8.1)	373	6.9	0.97	(0.86, 1.10)	1.01	(0.89, 1.14)
Disruptive, impulse-control, and conduct disorders	3,547	(5.3)	354	10.0	1.48	(1.31, 1.68)	1.32	(1.15, 1.51)
Personality disorders	106	(0.2)	7	6.6	1.00	(0.46, 2.16)	1.02	(0.47, 2.21)
Feeding and eating disorders	1,023	(1.5)	79	7.7	1.37	(1.07, 1.75)	1.21	(0.91, 1.60)
Somatic disorders	79	(0.1)	6	7.6	1.37	(0.59, 3.19)	1.54	(0.61, 3.93)
Suicidal ideation/attempt/intentional self-harm	4,032	(6.1)	158	3.9	0.65	(0.55, 0.78)	0.76	(0.62, 0.92)
Miscellaneous mental and behavioral disorders/conditions	70	(0.1)	4	5.7	0.87	(0.31, 2.42)	0.78	(0.24, 2.49)
Neurodevelopmental disorders	3,086	(4.6)	301	9.8	1.45	(1.27, 1.66)	1.23	(1.07, 1.43)
Substance-related disorders	937	(1.4)	45	4.8	0.74	(0.54, 1.01)	0.91	(0.65, 1.28)
Insurance type								
Public	37,539	(56.3)	3,260	8.7	1.32	(1.24, 1.41)	1.18	(1.10, 1.27)

(continued)

TABLE 1 Continued

	Overall		30-day readmissions					
	n	(%)	n	Rate, %	OR	(95% CI)	aOR	(95% CI)
Private	25,496	(38.3)	1,693	6.6	Reference		Reference	
Self-pay	1,472	(2.2)	85	5.8	0.85	(0.68, 1.07)	0.86	(0.67, 1.10)
None	36	(0.1)	1	2.8	0.36	(0.05, 2.68)	0.56	(0.08, 3.74)
Other	2,093	(3.1)	153	7.3	1.08	(0.91, 1.30)	1.04	(0.86, 1.25)
Admission day was on a weekend								
No	55,231	(82.8)	4,270	7.7	0.96	(0.89, 1.04)		
Yes	11,478	(17.2)	924	8.1	Reference			
Length of stay, days								
0-3	17,223	(26.1)	1,174	6.8	Reference		Reference	
4-7	31,243	(47.3)	2,264	7.2	1.35	(1.24, 1.46)	1.21	(1.11, 1.32)
8-14	12,878	(19.5)	1,264	9.8	2.16	(1.96, 2.38)	1.81	(1.63, 2.01)
≥15	4,700	(7.1)	442	9.4	2.19	(1.93, 2.50)	1.71	(1.48, 1.96)
Residents of the state								
Nonresident	2,853	(4.3)	124	4.3	0.54	(0.45, 0.65)	0.59	(0.48, 0.72)
Residents	63,857	(95.7)	5,070	7.9	Reference		Reference	
Income quartile								
Quartile 1 (lowest)	18,402	(27.9)	1,481	8.0	Reference			
Quartile 2	19,093	(28.9)	1,542	8.1	1.02	(0.94, 1.10)		
Quartile 3	16,737	(25.3)	1,267	7.6	1.01	(0.92, 1.09)		
Quartile 4 (highest)	11,841	(17.9)	846	7.1	1.01	(0.91, 1.11)		
Patient location: NCHS urban-rural code								
Central counties of metropolitan areas of ≥1 million population	12,489	(18.8)	1,063	8.5	Reference		Reference	
Fringe counties of metropolitan areas of ≥1 million population	16,446	(24.7)	1,159	7.0	0.89	(0.79, 0.99)	0.91	(0.81, 1.03)
Counties in metropolitan areas of 250,000-999,999 population	19,107	(28.7)	1,662	8.7	0.96	(0.85, 1.10)	1.03	(0.90, 1.18)
Counties in metropolitan areas of 50,000-249,999 population	7,614	(11.4)	571	7.5	0.90	(0.78, 1.04)	1.01	(0.86, 1.18)
Micropolitan counties	6,104	(9.2)	404	6.6	0.73	(0.62, 0.85)	0.76	(0.64, 0.89)
Neither metropolitan nor micropolitan counties	4,829	(7.3)	315	6.5	0.76	(0.65, 0.89)	0.87	(0.73, 1.03)
	Median	(Q1, Q3)	Median	(Q1, Q3)	Median	(Q1, Q3)	Median	(Q1, Q3)
Total charges, per \$1,000	15.0	(9.5, 26.0)	16.4	(10.2, 28.4)	1.00	(1.00, 1.00)		

Note: Both patient and hospital characteristics that were associated with MH readmission with $p < .2$ in univariate analysis were entered simultaneously into a multivariate model. Boldface indicates significant p value or . aOR = adjusted odds ratio; NCHS = National Center for Health Statistics, OR = odds ratio, Q = quarter.

between January 2019 and November 2019. A 30-day readmission rate of 7.8% was found for the overall sample with significantly higher rates for youth younger than 15 to 17 years. Having ≥3 primary MH conditions was associated with higher rates of readmission. Significantly higher

rates of readmission were noted for several diagnostic groupings, including schizophrenia spectrum and other psychotic disorders; other specified and unspecified mood disorders; obsessive-compulsive and related disorders; and disruptive, impulse-control, and conduct disorders. Having

TABLE 2 Hospital Characteristics for Children Hospitalized With a Primary Diagnosis of a Mental Health (MH) Condition

	Overall		30-day readmissions					
	n	(%)	n	Rate, %	OR	(95% CI)	aOR	(95% CI)
Bed size of hospital								
Small	7,543	(11.3)	460	6.1	Reference		Reference	
Medium	13,446	(20.2)	1,094	8.1	1.19	(0.93, 1.54)	1.09	(0.83, 1.44)
Large	45,721	(68.5)	3,640	8.0	1.31	(1.05, 1.62)	0.99	(0.76, 1.29)
Teaching status of hospital								
Metropolitan nonteaching	5,602	(8.4)	375	6.7	1.06	(0.75, 1.49)	0.77	(0.52, 1.13)
Metropolitan teaching	57,643	(86.4)	4,581	7.9	1.25	(0.96, 1.63)	0.79	(0.58, 1.09)
Nonmetropolitan hospital	3,465	(5.2)	238	6.9	Reference		Reference	
Hospital urban/rural designation								
Large metropolitan areas with at least 1 million residents	32,558	(48.8)	2,481	7.6	Reference			
Small metropolitan areas with <1 million residents	30,687	(46.0)	2,475	8.1	0.98	(0.84, 1.15)		
Micropolitan areas	2,912	(4.4)	207	7.1	0.84	(0.63, 1.13)		
Nonmetropolitan or micropolitan (nonurban residual)	553	(0.8)	31	5.6	0.67	(0.37, 1.23)		
Control/ownership of hospital								
Government, nonfederal	12,686	(19.0)	1,149	9.1	Reference			
Private, nonprofit	47,729	(71.6)	3,564	7.5	0.85	(0.69, 1.03)		
Private, investor-owned	6,295	(9.4)	481	7.6	0.85	(0.64, 1.14)		
	Median	(Q1, Q3)	Median	(Q1, Q3)	Median	(Q1, Q3)	Median	(Q1, Q3)
Total hospital discharges, per \$1,000	20.3	(12.1, 30.9)	22.0	(13.6, 33.0)	1.01	(1.00, 1.01)	1.01	(1.00, 1.01)

Note: Both patient and hospital characteristics that were associated with MH readmission with $p < .2$ in univariate analysis were entered simultaneously into a multivariate model. Boldface indicates significant p value or odds ratio. aOR = adjusted odds ratio; OR = odds ratio.

public insurance and a longer LOS were associated with significantly higher odds of an MH readmission.

We identified specific patient characteristics that were associated with MH readmission rates. Younger age groups with a longer length of index admission and public insurance had significantly higher odds of readmission. Schizophrenia spectrum and other psychotic disorders, bipolar and related disorders, and other specified and unspecified mood disorders all may be diagnosed in children, but earlier diagnoses may be associated with chronicity, severity, and more adverse risk factors.^{22,23} Younger children with public insurance with diagnoses such as schizophrenia spectrum and other psychotic disorders may have more serious treatment-resistant conditions that could also reflect a lack of community resources or family involvement intended to prevent readmission. These questions are difficult to answer from a deidentified national database analysis but merit future research.

The 2014 NDA has been used to show that 30-day psychiatric readmissions are lower at metropolitan non-children's and children's hospitals (5.6%) compared with

rural hospitals (7.4%) and that shorter LOS is associated with increased aOR for readmission in rural hospitals.¹⁷ Feng *et al.*¹⁸ took a similar approach in identifying risk factors associated with readmission in youth ages 5 to 17 years discharged between January 1, 2014, and November 30, 2014. They found that 30-day MH readmission rates were higher than non-MH readmission rates. Younger children with chronic non-MH conditions and with public insurance were more likely to be readmitted than their peers. The overall 30-day unplanned readmission rate for MH admissions was 8.0%. Our overall rate was consistent with their 30-day readmission rate of 8.0% for youths 5 to 17 years old in 2014.

Our findings can be used to develop targeted interventions to improve outcomes. Young children with diagnoses of schizophrenia or bipolar disorder and their families may benefit from research on inpatient treatment outcomes to evaluate the quality and length of care received and systems of care approaches providing more intensive community care to prevent rehospitalizations.^{24,25} This information can be used to place a larger emphasis on

TABLE 3 Hospital Characteristics for Children Hospitalized With a Primary Diagnosis of a Mental Health Condition^a That Was Significantly Associated With Higher Risk of 30-Day Readmission (Odds Ratio [OR] >1)

	Overall		30-day Readmissions			
	n	(%)	n	Rate, %	Univariate OR	(95% CI)
Bed size of hospital						
Small	2,110	(9.4)	188	8.9	Reference	
Medium	4,663	(20.7)	536	11.5	1.28	(0.95-1.74)
Large	15,775	(70.0)	1,670	10.6	1.22	(0.94-1.58)
Teaching status of hospital						
Metropolitan nonteaching	1,881	(8.3)	158	8.4	0.83	(0.54-1.28)
Metropolitan teaching	19,642	(87.1)	2141	10.9	1.11	(0.80-1.54)
Nonmetropolitan hospital	1,025	(4.6)	95	9.3	Reference	
Hospital urban/rural designation						
Large metropolitan areas with at least 1 million residents	11,757	(52.1)	1,213	10.3	Reference	
Small metropolitan areas with <1 million residents	9,766	(43.3)	1,086	11.1	1.02	(0.85-1.21)
Micropolitan areas	846	(3.8)	74	8.8	0.86	(0.60-1.24)
Nonmetropolitan or micropolitan (nonurban residual)	179	(0.8)	21	11.7	1.34	(0.63-2.83)
Control/ownership of hospital						
Government, nonfederal	5,067	(22.5)	617	12.2	Reference	
Private, nonprofit	15,274	(67.7)	1,522	10.0	0.94	(0.76-1.17)
Private, investor-owned	2,207	(9.8)	255	11.6	1.08	(0.79-1.49)

Note: ^aChildren with schizophrenia spectrum and other psychotic disorders; bipolar and related disorders; other specified and unspecified mood disorders; disruptive, impulse-control, and conduct disorders; feeding and eating disorders; and neurodevelopmental disorders.

psychoeducation, discharge planning, care coordination, and outpatient resources provided to these families upon hospital discharge of their initial stay.

Identifying the risk factors that contribute to MH readmissions also has implications for changes in policy directed toward improving readmission rates. Patients with multiple MH comorbidities were more likely to experience readmissions within 30 days than patients with a single MH diagnosis. As expected, and as found in the study by Feng *et al.*,¹⁸ patients with public insurance were more likely to be readmitted within 30 days than patients with private insurance or self-pay status, and longer LOS was also directly correlated with increasing rates of 30-day readmissions. Having more frequent follow-up MH care including in-home services could address barriers, improve receipt of psychosocial therapies, and reduce readmissions.^{26,27}

In contrast to Feng *et al.*,¹⁸ this study found no hospital characteristic to be significantly associated with increased risk of readmission. One might expect that hospitals with larger bed size are often more equipped to serve a patient population with more severe illness, whether this be through increased funding, number of staff, or services

rendered. Also, the NRD does not specify which hospitals specialize in pediatrics, but having specialized pediatric MH services within a freestanding children's hospital could be associated with distinct readmission rates.²⁸ This was not observed in our analysis. Further, our study was able to include T codes related to intentional self-harm or suicidal behaviors but did not find that the presence of these codes was associated with greater odds of readmission in youth.

Advantages to this study include similar methodology as Feng *et al.*¹⁸ with updated data and *ICD-10* diagnoses. As this study uses data collected throughout 2019, future studies may use this information as a baseline to compare effects of the 2019 COVID-19 pandemic on MH readmission rates. Future studies may also want to evaluate the readmission rates for youth leaving against medical advice.²⁹

Limitations of this study include not having access to data regarding race/ethnicity to examine and address important potential health disparities. This would be an extremely important factor to consider in light of structural racism and how this plays a part in services offered in communities and patients' access to MH services. Also, there are limitations inherent in this database, such as the inability to examine

longitudinal trends. First admission rates cannot be determined using these data, which would allow an examination of the effect of insurance types on access to care or denied presentations for readmission. Claims data can be limited by the accuracy and number of diagnoses indicated by providers and do not allow assessment of family involvement during the hospitalization via intervention codes. The quality of care received as an inpatient cannot be measured by the NRD. Once discharged, our database does not allow for studying relevant variables, such as treatment compliance, engagement of family, and care coordination with outpatient providers.³⁰ These limitations are areas for consideration in future research.

Despite the limitations, this study identifies risk factors for readmission of youth for treatment of MH conditions. It offers an important baseline as we begin to understand the impact of the COVID-19 pandemic, staffing issues, and caretaker burnout that has led to the declaration of a pediatric MH crisis. This study adds to the voices calling for an increase in the investment for pediatric MH to increase access to care and care quality.

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