Readmission After Pediatric Mental Health Admissions

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abstract

BACKGROUND AND OBJECTIVES: Reducing readmissions is a major health care system goal. There is a gap in our understanding of pediatric readmission patterns after mental health (MH) admissions. With this study, we aimed to characterize the prevalence of readmissions after MH admissions, to identify patient-level factors and costs associated with readmissions, and to assess variation in readmission rates across hospitals.

METHODS: Using the 2014 Healthcare Cost and Utilization Project all-payer Nationwide Readmissions Database, we conducted a retrospective cohort analysis of 253 309 admissions for 5- to 17-year-olds at acute-care hospitals in 22 states. We calculated 30-day unplanned readmission rates, lengths of stay, and costs by primary admission diagnosis. We used hierarchical regression models to assess differences in readmission rates by patient characteristics, primary diagnoses, and comorbid chronic conditions, and to estimate the variation in case mix–adjusted rates across hospitals.

RESULTS: MH stays accounted for 18.7% (n = 47 397) of index admissions. The 30-day readmission rate for MH admissions was higher than for non-MH admissions (8.0% vs 6.2%; $P < .001$). Children who were ≤14 years old, had non-MH chronic conditions, and/or had public insurance were more likely to be readmitted than their peers ($P < .001$ for each). Adjusted rates varied across hospitals ($P < .001$) and were 97.9% greater for hospitals 1 SD above versus below (11.2% vs 5.6%) the mean. Adjusted readmission rates, lengths of stay, and costs differed by diagnosis ($P < .001$).

CONCLUSIONS: The 30-day readmission rate was significantly higher after MH than non-MH admissions. Adjusted MH readmission rates varied substantially among hospitals, suggesting potential room for improvement.

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WHAT'S KNOWN ON THIS SUBJECT: Mental health (MH) conditions are among the most common reasons for hospitalization of children, but we lack understanding of readmission patterns after these admissions.

WHAT THIS STUDY ADDS: MH admissions accounted for one-fifth of pediatric hospitalizations and were more likely to be followed by an unplanned readmission than other admissions. MH readmission rates varied across hospitals more than what would be expected from differences in case mix.

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Mental health (MH) conditions are among the most prevalent and costly health problems in the United States.[1,2] One in 5 children has had a seriously debilitating mental disorder.[3] Children living with MH conditions experience substantial quality-of-life impairments.[4–7] Undertreated MH conditions during childhood not only impose immediate costs on families and health care systems but also reduce lifetime earnings and increase long-term medical spending.[7–11] Psychiatric care constitutes a substantial and growing proportion of pediatric inpatient care use, accounting for 10% of all pediatric admissions and $3.3 billion in aggregate charges in 2014.[2,12] In the last 2 decades, mood disorders alone have overtaken asthma as the most common reason for admission among children aged 1 to 17 years, with a 68% increase in the rate of mood disorder hospitalizations despite a 26% decrease in the overall hospitalization rate for the age group.[1,2]

As a measure of quality of inpatient care, readmission rates have become a national focus.[13] Recurrent hospitalizations are disruptive for families[14–17] and a driver of cost to the health care system.[18–20] Targeting MH readmissions could reveal rich opportunities for quality improvement because successful management of MH conditions is particularly predicated on longitudinal relationships outside the acute-care setting. However, the current National Quality Forum–endorsed pediatric all-condition measure, commissioned by the Agency for Healthcare Research and Quality (AHRQ) and Centers for Medicare and Medicaid Services, does not include hospitalizations for MH conditions.[21] Although questions have been raised as to whether MH conditions should be added, little is known about the prevalence or burden of pediatric MH readmissions.

To help prioritize opportunities to improve clinical practice and reduce readmissions, as well as to guide quality measure development, information is needed about which patient and clinical characteristics are associated with the most readmissions and how much readmission rates vary across hospitals. Variation in rates might signal modifiable community-, systems-, hospital-, and family-level levers for quality improvement.[22]

METHODS

Study Cohort

We conducted a retrospective cohort analysis of 5- to 17-year-olds who were discharged between January 1, 2014 and November 30, 2014, from 1813 community hospitals in the AHRQ all-payer Nationwide Readmissions Database (NRD).[23] The data set captures all discharges at nonfederal public and private hospitals in 22 geographically dispersed states that account for 51.2% of the total US population and 49.3% of hospitalizations.

We started with all hospitalizations for patients within the study age range, as well as for those aged 18 years, to capture all readmissions (n = 406 773). Records for multiple hospitalizations that included transfer to an acute care hospital were combined, and subsequent readmissions were attributed to the final discharging hospital. We excluded patients with any missing primary diagnoses (<0.1%; n = 110), as well as records related to obstetric conditions (15.0%; n = 60 999) because labor and delivery does not generally fall within the purview of pediatric providers.[21–25] We excluded index admissions for patients who were aged >17 years at discharge, left against medical advice, or died, leaving 253 309 index admissions. We identified primary MH admissions using clinician-reviewed definitions that aggregate >200 MH-related *International Classification of Diseases, Ninth Revision, Clinical Modification* (ICD-9-CM) diagnosis codes into 17 mutually exclusive categories on the basis of *Diagnostic and Statistical Manual of Mental Disorders IV* and *V*.[2] The NRD does not contain information about the admitting service. Therefore, MH admissions reflect care provided on medical and psychiatric services of acute care hospitals.

Because race and/or ethnicity was not available in the NRD, we conducted a subanalysis using the 2014 AHRQ New York State Inpatient Database, which included additional sociodemographic variables for the subset of NRD records from hospitals in New York.[26]

Main Outcome Measures

We defined a readmission as the first unplanned admission within 30 days of an index admission. Any subsequent admissions that occurred within 30 days were not counted as either readmissions or new index admissions. Because a subject's hospitalizations could only be linked within a state, readmissions after an index admission in a different state were not captured. We compared the prevalence of readmissions after MH index versus non-MH index admissions. For MH index admissions, we estimated differences in readmission rates by patient and clinical characteristics, as well as variation in rates among hospitals. We included unplanned readmissions for any reason because patients might have been readmitted for related conditions even if the index and readmission diagnoses differ, but we also conducted an analysis of readmissions with diagnoses matching those of index admission. To exclude planned readmissions, we used the Pediatric Planned Procedures Algorithm (Supplemental Materials)[21–25] and additionally excluded readmissions with a

primary procedure or diagnosis code for chemotherapy.[21–25] These admissions are usually part of the patient's intended course, unrelated to quality. Mean length of stay and cost were calculated for the first unplanned 30-day readmission, as previously described.[27]

Patient and Clinical Characteristics

We assessed associations of readmission rates with patient sociodemographic (sex, age, insurance status) and clinical (primary diagnosis, comorbid chronic conditions) characteristics, which were chosen a priori on the basis of previous studies.[21–25] Insurance status was categorized as public, private, self-pay, and other. We used the Chronic Condition Indicator (CCI) to dichotomize ICD-9-CM diagnosis codes into chronic or nonchronic conditions and aggregate conditions into 18 mutually exclusive groups (eg, cardiovascular).[28] The number of non-MH CCI groups for each index admission served as an indicator of medical complexity.[21–25]

Statistical Analyses

To assess variation in readmission rates, we estimated hierarchical regression models with random effects for hospital and fixed-effect predictors for patient and clinical characteristics. To compare overall readmission rates after MH and non-MH index admissions, we estimated the effect of an MH condition as the primary diagnosis, adjusting for sex, age, and the number of non-MH CCIs. To assess differences in MH readmission rates by patient and/or clinical characteristics, we conducted separate bivariate analyses to predict MH readmissions from each characteristic. Characteristics associated with readmission with $P < .20$ in bivariate analysis were entered simultaneously into a multivariate model. Block tests with multiple degrees of freedom were used to determine the significance of each fixed effect with >2 levels.

To account for differences in case mix in assessing variation in readmission rates among hospitals, we adjusted for sex, age, primary MH diagnosis, and number of comorbid chronic conditions, as in previous studies.[21–25] Adjusted readmission rates were calculated by averaging predicted rates from case-mix regression models in which the hospital variable was fixed, and observed values from the entire population were used for the remaining independent variables.[21,22] Variation in adjusted readmission rates was quantified by the hospital-level random-effect variance in the regression model. Likelihood ratio tests were used to determine the significance of the random-effect estimate. Case mix–adjusted hospital readmission rates were calculated by direct standardization, predicting hospital rates under the same hierarchical regressions by using standard populations reflective of the overall cohort case mix. Because hospitals that provide more MH care might care for patients with more severe MH conditions that might not be captured in the case-mix model, we also assessed rates separately for hospitals in the top decile for volume (n >420) or proportion (>75%) of MH admissions.

To estimate adjusted costs and lengths of stay by primary diagnosis, we calculated predictive margins from hierarchical γ and negative binomial regressions, respectively, accounting for sex, age, and number of non-MH CCIs. In each analysis, we calculated robust SEs and 2-sided tests at level 0.05 using SAS 9.4 (SAS Institute, Inc, Cary, NC) and Stata 14.1 (StataCorp, College Station, TX). Boston Children's Hospital's Institutional Review Board approved the study.

RESULTS

Among 253 309 index admissions, 18.7% were for a primary MH diagnosis (n = 47 397). The median age among MH patients was 15 years (interquartile range, 13–16). Sixty-four percent had no non-MH comorbid chronic conditions, and 10.0% had conditions in 2 or more CCI groups (Table 1). The most common non-MH CCIs were respiratory diseases (n = 7656; 16.2%) and endocrine disorders (n = 5772; 12.2%).

The unadjusted 30-day unplanned readmission rate for MH admissions was 8.0% (n = 3783), which was higher than the rate of 6.2% (n = 12 781) for non-MH admissions ($P < .001$). This difference remained significant after adjusting for age, sex, and number of non-MH CCIs ($P < .001$).

Index Admission Diagnoses

Table 1 shows the 10 most prevalent MH primary diagnoses, which accounted for 98.7% of all MH index admissions. Mood disorders were the most common, with depression and bipolar disorders accounting for 60.0% and 10.9% of admissions, respectively. Externalizing disorders constituted 6.5% of admissions, most of which were for oppositional defiant (38.7%), impulse-control (31.9%), and conduct disorders (29.1%).

Readmission Rates by Patient and Clinical Characteristics

In bivariate analysis, MH readmission rates varied significantly by sex, age, comorbid chronic conditions, primary diagnosis, and insurance type (P = .03 for sex; $P < .001$ for other block tests) (Table 1). Except for sex (P = .60), all other bivariately significant adjusters remained significant in multivariate analysis ($P < .001$ for each). Compared with 15- to 17-year-olds, younger children were more likely to be readmitted.

TABLE 1 Thirty-Day MH Readmission Rates by Patient Characteristics

Characteristics	Index Admissions No. (%) (n = 47 397)[a]	30-d Readmissions			
		No.	Rate, %	Bivariate Odds Ratio (95% CI)[b]	Multivariate Odds Ratio (95% CI)[c]
Sex					
Boy	20 157 (42.5)	1688	8.4	1.08 (1.01–1.15)	1.02 (0.95–1.09)
Girl	27 240 (57.5)	2095	7.7	Reference	Reference
Age, y					
5–8	2540 (5.4)	211	8.3	1.22 (1.05–1.42)	1.22 (1.04–1.43)
9–12	8115 (17.1)	816	10.1	1.49 (1.36–1.63)	1.48 (1.35–1.63)
13–14	12 816 (27.0)	1076	8.4	1.23 (1.13–1.33)	1.24 (1.14–1.34)
15–17	23 926 (50.5)	1680	7.0	Reference	Reference
No. non-MH CCIs[d]					
≥2	4733 (10.0)	422	8.9	1.25 (1.12–1.40)	1.22 (1.09–1.36)
1	12 450 (26.3)	1037	8.3	1.14 (1.05–1.23)	1.11 (1.03–1.20)
None	30 214 (63.7)	2324	7.7	Reference	Reference
Primary diagnosis[e]					
Depression	28 437 (60.0)	2187	7.7	Reference	Reference
Bipolar disorders	5169 (10.9)	513	9.9	1.34 (1.21–1.50)	1.33 (1.20–1.49)
Externalizing disorders	3074 (6.5)	264	8.6	1.11 (0.96–1.27)	1.00 (0.87–1.15)
Reaction disorders	2740 (5.8)	142	5.2	0.58 (0.48–0.70)	0.58 (0.48–0.70)
Psychosis	2324 (4.9)	269	11.6	1.56 (1.36–1.79)	1.60 (1.39–1.84)
Anxiety disorders	2136 (4.5)	140	6.6	0.86 (0.72–1.03)	0.82 (0.69–0.99)
ADHD	1506 (3.2)	138	9.2	1.15 (0.96–1.39)	1.01 (0.83–1.23)
Autism spectrum disorder	484 (1.0)	44	9.1	1.25 (0.91–1.72)	1.14 (0.83–1.56)
Eating disorders	474 (1.0)	39	8.2	1.12 (0.80–1.58)	1.09 (0.77–1.54)
Substance-related disorders	446 (0.9)	12	2.7	0.33 (0.19–0.60)	0.38 (0.21–0.68)
Other MH diagnoses	607 (1.3)	35	5.8	0.79 (0.56–1.12)	0.73 (0.51–1.03)
Insurance[f]					
Public	26 264 (55.5)	2281	8.7	1.26 (1.17–1.36)	1.20 (1.11–1.29)
None	1102 (2.3)	61	5.5	0.75 (0.58–0.98)	0.78 (0.60–1.02)
Other	2307 (4.9)	194	8.4	1.12 (0.94–1.32)	1.11 (0.94–1.31)
Private	17 653 (37.3)	1242	7.0	Reference	Reference

[a] MH was the primary diagnosis of 47 397 (18.7%) of 253 309 index admissions.

[b] To assess whether readmission rates varied by each patient characteristic, the P value from multiple degrees of freedom block test on all categories of each characteristic was calculated from a hierarchical logistic regression model with fixed effect for the characteristic and random effect for hospital. P = .03 for block test of sex, and P < .001 for block tests of all other characteristics in bivariate analysis.

[c] aOR from hierarchical logistic regression model with random effect for hospital and fixed effects for all characteristics that were significant in bivariate analysis with P < .20. P = .60 for block test of sex, and P < .001 for block tests of all other characteristics in multivariate analysis.

[d] The CCIs, developed by the AHRQ, categorize ∼14 000 ICD-9-CM diagnosis codes as chronic or not chronic and assign codes into 1 of 18 mutually exclusive body system groups.

[e] Other MH diagnoses include personality, reactive attachment, motor, elimination, developmental, and sexual and/or gender identity disorders, each accounting for <1% of MH admissions.

[f] Index admissions with missing insurance type (0.1%, n = 71) were excluded in the respective bivariate analysis and in the multivariate model.

Readmission rates were higher for children with coexisting non-MH chronic conditions. By primary diagnosis, rates were higher for psychosis (11.6% [adjusted odds ratio (aOR) 1.60; 95% confidence interval (CI), 1.39–1.84]) and bipolar disorders (9.9% [aOR 1.33; 95% CI, 1.20–1.49]) than for depression (7.7%). Rates were lower for reaction disorders (5.2% [aOR 0.58; 95% CI, 0.48–0.70]) and substance-related disorders (2.7% [aOR 0.38; 95% CI, 0.21–0.68]) than for depression. Children with public insurance (8.7% [aOR 1.20; 95% CI, 1.11–1.29]) were more likely to be readmitted than children with private insurance (7.0%).

In a subanalysis of 8737 admissions at New York State hospitals, race and/or ethnicity was significantly associated with readmission rates bivariately (P < .001) and multivariately (P = 0.01) (Supplemental Table 3). Rates were higher for children who were non-Hispanic African American (10.6%; P = .001) and Hispanic (10.1%; P = .006) than for white children (6.9%), adjusting for age, primary MH diagnosis, the number of comorbid non-MH conditions, and insurance type.

Variation in Readmission Rates

Unadjusted readmission rates after index hospitalizations for all MH conditions varied significantly among hospitals (P < .001), and this variation persisted after case-mix adjustment (P < .001). Among the 112 hospitals in the top quartile of MH index admissions (n >80), adjusted rates were significantly below the mean for 14 hospitals and above the mean for 11 hospitals (Fig 1). To illustrate the magnitude of variation among hospitals, we compared the rates predicted for hypothetical hospitals with random effects 1 SD

above and below the mean (Fig 2). The adjusted all-condition rate of 11.2% for hospitals 1 SD above the mean was twice the rate of 5.6% for hospitals 1 SD below the mean. Readmission rates at hospitals with high volumes or proportions of MH admissions did not differ significantly from hospitals with lower volumes ($P = .13$) or proportions ($P = .88$) of MH admissions. Adjusted rates varied significantly among hospitals with high volumes and among hospitals with high proportions of MH admissions ($P < .001$ for each). Unadjusted and adjusted readmission rates also varied across hospitals when the readmission follow-up period was redefined to 7, 14, or 60 days after the index admission ($P < .001$ for each). In all cases, the amount of variation did not differ significantly from what was observed at 30 days.

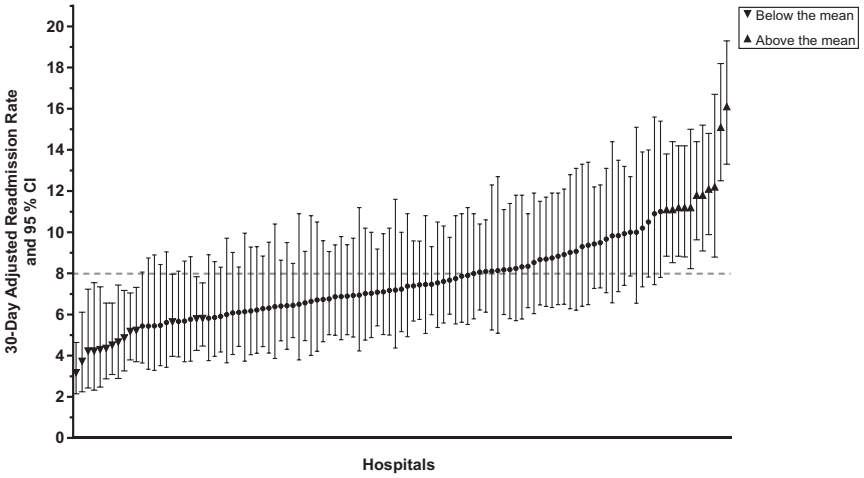

FIGURE 1
Adjusted 30-day readmission rate variation among hospitals in the top quartile of MH index admissions. The 112 hospitals in the top quartile of MH index admissions ($n > 80$) were included. Significant variation in readmission rates existed after adjusting for sex, age, primary diagnosis, and number of non-MH comorbid chronic conditions ($P < .001$). The dashed line indicates the mean unadjusted readmission rate.

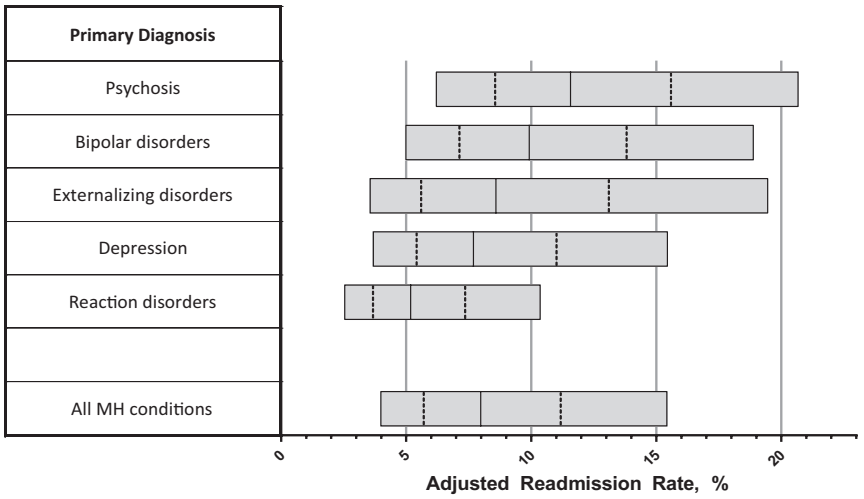

FIGURE 2
Variation in adjusted all-condition and condition-specific 30-day MH readmission rates. Adjusted readmission rates for hospitals 1 or 2 SD above and below the mean were estimated for MH conditions (with significant hospital-level variation) by using hierarchical logistic regressions that accounted for sex, age, and number of non-MH comorbid chronic conditions. $P < .001$ for each condition, except $P = .009$ for psychosis and $P = .04$ for reaction disorders. Adjusted all-condition readmission rates were similarly calculated, with additional adjustment for primary diagnosis. The solid line through the middle of each box indicates mean rates; dotted lines indicate ±1 SD of the mean; box boundaries indicate ±2 SD.

Readmission Diagnoses

Of children readmitted within 30 days of a MH admission, 94.8% ($n = 3588$) were readmitted for a MH primary diagnosis. MH was the most common primary readmission diagnosis for each of the 10 most prevalent conditions.

Length of Stay and Cost of Readmissions

The mean readmission length of stay for all MH conditions (adjusted for sex, age, and number of comorbid chronic conditions) was 7.4 days (95% CI, 6.6–8.2). Adjusted lengths of stay varied significantly by primary diagnosis and across hospitals ($P < .001$ for both) (Table 2). Conditions with the longest adjusted lengths of stay included psychosis (10.3 days; 95% CI, 9.0–11.8) and attention-deficit/hyperactivity disorder (ADHD) (9.6 days; 95% CI, 8.1–11.3). Readmissions after admissions for substance-related disorders (3.8 days; 95% CI, 2.3–6.3) and reaction disorders (6.4 days; 95% CI, 5.5–7.6) had the shortest lengths of stay.

Adjusted per-readmission costs, which averaged $6781 (95% CI, $5998–$7667) across all MH conditions, varied significantly by index admission diagnosis and among hospitals ($P < .001$ for each). Conditions with the highest readmission cost included psychosis ($9024; 95% CI, $7822–$10 411) and anxiety disorders ($8447; 95% CI, $7175–$9945). Substance-related disorders ($4727; 95% CI, $3060–$7301) and reaction disorders ($5626; 95% CI, $4770–$6635) had the lowest per-readmission costs.

TABLE 2 Adjusted Length of Stay and Cost of 30-Day MH Readmissions

Primary Diagnosis	30-d Readmission	
	Mean Length of Stay, d (95% CI)	Mean Cost, $ (95% CI)[a]
Psychosis	10.3 (9.0–11.8)	9024 (7822–10411)
ADHD	9.6 (8.1–11.3)	7707 (6522–9108)
Bipolar disorders	8.7 (7.7–9.7)	7319 (6429–8332)
Anxiety disorders	8.2 (7.0–9.7)	8447 (7175–9945)
Eating disorders	8.1 (6.1–10.8)	7652 (5698–10278)
Autism spectrum disorder	7.9 (6.2–10.2)	6956 (5452–8874)
Externalizing disorders	7.4 (6.5–8.5)	6238 (5414–7186)
Depression	7.2 (6.5–8.0)	6206 (5526–6971)
Reaction disorders	6.4 (5.5–7.6)	5626 (4770–6635)
Substance-related disorders	3.8 (2.3–6.3)	4727 (3060–7301)
Other MH diagnoses	5.7 (4.2–7.6)	5919 (4435–7901)
All MH conditions	7.4 (6.6–8.2)	6781 (5998–7667)

Adjusted mean length of stay and cost per readmission were estimated as marginal predictions from negative binomial and γ regression models, respectively, by using the overall cohort distributions of sex, age, and number of non-MH comorbid chronic conditions. Length of stay and cost were significantly associated with primary diagnosis ($P < .001$ for each block test).

[a] Cost could not be estimated because missing data for 64 (1.7%) readmissions.

DISCUSSION

In a large national cohort of hospitals, 8.0% of children admitted for MH conditions experienced an unplanned 30-day readmission, compared with 6.2% of those hospitalized for non-MH conditions. The rate, length of stay, and cost of readmissions varied across specific MH diagnoses, and all 3 measures were high for psychosis and low for reaction and substance-related disorders. Readmission rates also varied significantly among hospitals after adjusting for case-mix differences.

Previous research has revealed that readmission rates are associated with a child's age,[20,22,29] medical complexity,[20,22,29–32] race and/or ethnicity,[20,22,29] and insurance status,[20,22,29,31,33–35] but no large cohort study has been focused on pediatric MH patients. In our study, we found that MH readmissions were more frequent for patients in late adolescence than for those who were younger, in contrast to previous studies that revealed increasing all-condition readmissions with age. This difference could reflect the inverse relationship between severity and age of onset for some conditions as well as increased need for inpatient stabilization closer to time of onset.[36]

We found that African American and Hispanic children were more likely to be readmitted than white children, a disparity not readily explained by differences in age, MH diagnosis, the number of coexisting chronic conditions, or insurance status. Our work adds to a large body of evidence indicating health disparities, which are important to understand for quality improvement and policymaking purposes.[37–39]

We found, as in all-condition readmission studies,[20,22,29–32] that readmission use and cost were higher for patients who were more medically complex, which included those with more comorbidities and those with conditions that typically require higher-intensity care, such as psychosis.[2] Nonetheless, for many of the most common MH diagnoses, substantial hospital variation in readmission rates remained after adjusting for the relative mix of patient complexity at each hospital.

The variation that we found in MH readmission rates suggests likely room for improvement. Central to the debate regarding readmissions is the issue of attribution. Researchers should explore the reasons for variation and the degree to which readmissions are preventable.

Hospital-level variation could reflect disparities at each stage of care. First, variation may reflect differences in care during the initial hospitalization. For example, lower quality of discharge planning has been linked with frequent readmissions.[40–43] Patients without outpatient appointments in place before discharge from a psychiatric hospitalization were twice as likely to be readmitted within the same year.[44] Second, variation may reflect differences in postdischarge care. For example, receipt of outpatient therapy and appropriate medication regimens could be protective against readmissions.[45–47] Primary care physicians of publicly insured and uninsured patients reported more difficulties accessing outpatient MH services because of lack of provider options and longer wait times.[48,49] As in previous studies, we found that children with public insurance were more likely to be readmitted. Third, variation may reflect differences in community factors. From a structural standpoint, accessibility of public transportation,[50] availability of paid family leave,[51,52] and geographic distribution of hospital beds can affect care access.[53] From a family standpoint, cultural attitudes toward MH could influence engagement in care,[37,54,55] and difficult family dynamics are associated with higher inpatient use.[56]

On average, children readmitted after MH admissions were hospitalized for more than a week. Recurrent lengthy hospital stays not only place additional stress on families but also increase children's exposure to harms of inpatient stays (eg, nosocomial infections).[19] Frequent discontinuities in their environment might be particularly deleterious to children with certain MH disorders.[57] From a systems perspective, the high prevalence of MH admissions and long lengths of stay on readmission make inpatient MH care an important

target for measurement and potential quality improvement.

One criticism of readmissions measures has been that relatively few readmissions seem to be related to the index admission.[22,58] In contrast, we found that <1 in 10 MH readmissions were for non-MH primary diagnoses, and many non-MH diagnoses were nevertheless likely clinically related (eg, readmissions for electrolyte derangements in patients with eating disorders). The specificity of readmissions at capturing related events may make MH particularly suitable for quality measurement.

Our study has several limitations. First, our data do not distinguish admission to psychiatric versus general medicine services and do not include specialty psychiatric hospitals. Future research should ascertain whether children receive adequate MH care or experience differential readmission risk when admitted to general medicine services, especially as inpatient psychiatric beds become increasingly scarce.[59,60] Second, we did not assess receipt of outpatient care, which has been associated with readmission risk.[40,42] Third, some primary MH diagnoses might represent undiagnosed non-MH conditions. For example, autoimmune encephalitis or epilepsy could underlie psychosis,[61] and lead poisoning or cardiac arrhythmias can manifest as pathologic anxiety.[62] In such cases, readmission patterns would not necessarily reflect the quality of MH care. Lastly, the data set does not disclose geographic details of hospitals, limiting our ability to model state-level effects, which might be important given interstate variations in public insurance.[34]

CONCLUSIONS

Thirty-day MH readmission rates were higher after MH than non-MH admissions. MH readmission rates differed by age, insurance type, MH diagnosis, and number of coexisting chronic conditions. MH readmissions generally had long lengths of stay with high likelihood of being related to the initial admission, and rates varied significantly across hospitals in excess of case-mix differences. Given their prevalence and substantial hospital-level variation, MH readmissions might be a useful measure of quality. We offer insight into factors associated with readmissions and which conditions incur the highest use and cost burden, which could help prioritize specific targets for quality improvement.

ABBREVIATIONS

ADHD: attention-deficit/hyperactivity disorder
AHRQ: Agency for Healthcare Research and Quality
aOR: adjusted odds ratio
CCI: Chronic Condition Indicator
CI: confidence interval
ICD-9-CM: *International Classification of Diseases, Ninth Revision, Clinical Modification*
MH: mental health
NRD: Nationwide Readmissions Database

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