Rates and Predictors of Rehospitalization Among Formerly Hospitalized Adolescents

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Objective: **The authors examined rates and predictors of rehospitalization among 180 adolescents followed up for up to 10.3 years after discharge from an inpatient psychiatric unit.** ***Methods:*** **In this prospective, naturalistic study, demographic variables, including gender, race, and age, and psychiatric variables, including diagnoses, prehospitalization suicide attempts, and previous hospitalizations, were examined as potential predictors of rehospitalization. Information about rehospitalizations was repeatedly assessed and verified with treatment records.** ***Results:*** **During the follow-up period, 79 adolescents (44 percent) had one or more rehospitalizations. By six months after discharge, 19 percent of the adolescents had been rehospitalized. The mean time to first rehospitalization was estimated to be 5.7 years. Univariate analyses revealed significant differences between adolescents who were rehospitalized and those who were not in terms of age, presence of an affective disorder, and presence of a comorbid psychiatric disorder. In the multivariate predictor model, age and the presence of an affective disorder were the only significant predictors of rehospitalization.** ***Conclusions:*** **Clinicians should examine risk of rehospitalization before discharge, especially for younger patients and those with depression. Future research must focus on methods of intervention for this high-risk group.** (***Psychiatric Services*** **54:994–998, 2003)**

Psychiatric hospitalizations are associated with considerable costs, are more restrictive than other forms of care, and are typically used only when all other forms of care have proven unsuccessful or when safety is an issue (1,2). Nonetheless, despite efforts to limit the use of inpatient care, many individuals who are hospitalized have been hospitalized before (2) and will be again. Among children and adolescents, estimates of rehospitalization rates have ranged from 11 or 12 percent, in a study linking medical records of adolescent self-poisoners (3), to between 30 and 50 percent in studies that relied on follow-up contacts (4–7).

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Information about predictors of rehospitalization among youths is important for planning and prevention, but such information is scarce. Some data suggest that youths with certain psychiatric diagnoses have an elevated risk of rehospitalization. Asarnow and colleagues (8) found that children with depressive disorders had high rehospitalization rates, and Foster (9) found that children and adolescents with a diagnosis of major depression had a greater likelihood of rehospitalization than other youth inpatients. Foster also noted that oppositional defiant disorder was associated with a higher risk of rehospitalization and posttraumatic stress disorder with a lower risk, but few other studies have documented relationships between conduct problems or anxiety disorders and rehospitalization rates. Findings have been inconsistent with regard to whether substance use disorders (10,11) or psychosis (8,12–14) are related to subsequent risk of rehospitalization.

One indicator of the range or multiplicity of behavioral health problems is comorbid psychiatric illness, but this has received minimal attention in the literature on children and adolescents and rehospitalization. Asarnow and colleagues (8) found higher rehospitalization rates among children with comorbid depression and dysthymia than among those with only major depression, but we know of no other studies that examined comorbid psychiatric illnesses as a pre-

dictor of psychiatric hospitalization.

Suicidality is one of the primary reasons for psychiatric hospitalization (15), and history of suicide attempts is one of the most potent predictors of later attempts (16). However, in one follow-up study, no substantial differences in risk of rehospitalization over an extended follow-up period were observed between suicidal and nonsuicidal youths (4). In another study of adolescents and adults, individuals who were rated as having greater suicidal potential at the index hospitalization were less likely to be rehospitalized within one year than other patients (11). We are aware of no studies that have differentiated between first-time and repeat suicide attempters in assessing risk of rehospitalization, despite clinical differences between these groups (17–19).

It is not clear whether history of hospitalization is related to future hospitalization. Bickman and colleagues (20) found that hospitalization was a predictor of rehospitalization in a continuum-of-care demonstration program but was less of a factor at comparison sites. Peterson and colleagues (15) found hospitalization to be associated with reduced likelihood of subsequent presentation to an emergency setting with suicidality; suicidality was found to be a risk factor for hospitalization. In child and adolescent inpatient settings, the association between history of hospitalization beyond the index hospitalization and risk of rehospitalization has not been examined.

The relatively few studies that have examined demographic variables as possible predictors of readmission have yielded varied results. Most studies that included children or adolescents in the sample (7,10,11,14), but not all studies (9), did not find gender differences in rates of rehospitalization. Contradictory findings have been reported on the relationship between age and rehospitalization (7,8,14,21) and between race or ethnicity and rehospitalization (8–10).

In sum, relatively few studies have systematically examined risk of psychiatric rehospitalization among youths, and, across these studies, many of the findings have been inconsistent. This inconsistency may be due in part to differing durations of follow-up across studies and to the fact that few of the studies repeatedly assessed youths over time, making it more difficult to accurately gauge rates of rehospitalization and predictors of time until readmission.

Using data from a prospective, repeated-assessment, naturalistic study of suicidal behavior among adolescents after psychiatric hospitalization, we examined the rate of rehospitalization among adolescent psychiatric inpatients and assessed potential predictors of rehospitalization—psychiatric diagnoses, history of suicide attempts, history of multiple hospitalizations, and demographic variables.

Methods

Participants and procedure

The 180 adolescents who participated in this study were hospitalized between September 4, 1991, and April 10, 1995. Their median age at hospitalization was 14.8 years. The study was approved by an institutional review board. The youths were recruited from among those who were consecutively discharged from an inpatient psychiatric unit at a university-affiliated hospital in a southeastern state. To be eligible to participate, adolescents had to be aged 12 to 19 years; show no evidence of mental retardation; be admitted to the unit for at least ten days; show no evidence of serious systemic physical disease, such as diabetes or seizure disorder; be still living in the two-state area served by the hospital at the first follow-up; not have a sibling already participating in the study; and be able to cooperate with and complete the inpatient assessment.

Of 215 potentially eligible participants, 180 (84 percent) agreed to participate in the study. The final sample consisted of 91 girls and 89 boys, of whom 144 (80 percent) were Caucasian and 30 (17 percent) were African American; the remainder were Hispanic, Native American, or of Asian-American heritage. This study is ongoing, and the participants are still being followed. As of the cutoff for these analyses—February 21, 2002—the adolescents had been followed up for a maximum of 10.3 years (median of 8.4 years). A total of 17 participants (9 percent) have dropped out, and four have died (none from suicide).

All youths were assessed during their hospitalization and at various follow-up points—initially a semiannual assessment but later scheduled every eight to 12 months. The frequency of later assessments varied within and among study participants because of scheduling conflicts, staff shortages, and participants' requests.

Baseline diagnoses

Baseline assessments included semistructured psychiatric diagnostic interviews using the Interview Schedule for Children and Adolescents (ISCA) (22). *DSM-IV* axis I diagnoses were determined on the basis of all available information, including data from the diagnostic interview and treatment records; these diagnoses were independently reviewed and were arrived at by consensus (16). We focused on conduct disorder, oppositional defiant disorder, anxiety disorders, affective disorders, and substance use disorders as potential predictors. We did not separately examine disorders associated with psychosis because of the relatively small proportion of youths with such disorders who met the study's inclusion criteria. Comorbid psychiatric illness was defined as having more than one axis I psychiatric disorder at the time of the index hospitalization.

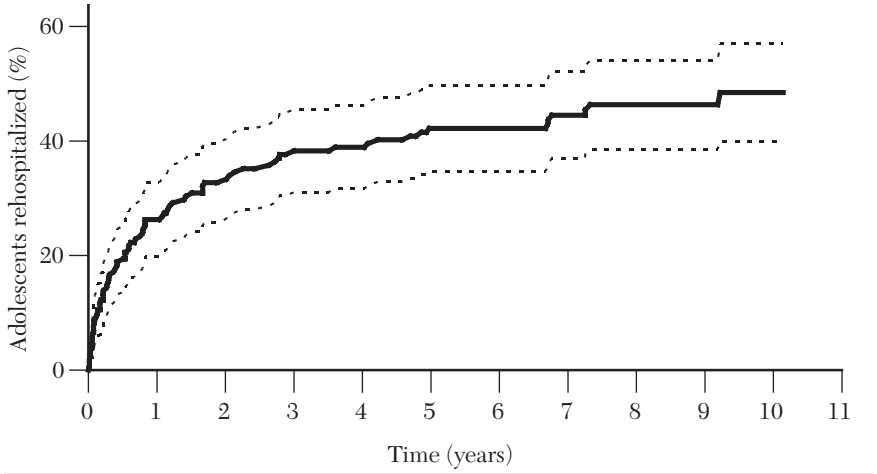
Baseline suicidality

Assessments of suicidal behavior—at the time of the index hospitalization and over the follow-up period—also were made with the ISCA. Our procedures for the assessment and classification of suicidal behaviors have been described previously (16,23). The reliability and predictive validity of the assessment of suicide attempts with the ISCA have been demonstrated (16,24).

A total of 105 (58 percent) of the 180 adolescents did not have a history of suicide attempts before hospitalization. Of the remaining adolescents, 41 (23 percent) attempted suicide once before their index hospitalization, and 34 (19 percent) attempted suicide between two and seven times. Of the 75 adolescents with a history of

Figure 1

Estimated proportion of 180 previously hospitalized adolescents who were rehospitalized; the upper and lower curves represent the 95 percent confidence bands



attempts, 42 (56 percent) made suicide attempts within two weeks before their hospitalization.

Sociodemographic variables and hospitalization

Sociodemographic and prehospitalization treatment variables, including gender, race or ethnicity, and age at hospitalization, were extracted from medical records. Before the index hospitalization, 36 youths (20 percent) were hospitalized on one previous occasion, nine (5 percent) were hospitalized twice, and five (3 percent) were hospitalized three times.

In follow-up assessments, rehospitalization data were collected and recorded by using a follow-up information sheet, a data entry form modeled after the intake information sheet developed by Kovacs (unpublished manuscript, Kovacs M, University of Pittsburgh, 1982). Although the reliability of reports in response to the inquiries on this form was not assessed, dates of rehospitalization were verified when possible with records obtained from treating facilities; we were able to obtain 82.3 percent of requested records.

Statistical analysis

Survival analyses were used to estimate the distribution of time to first rehospitalization. The proportion of adolescents rehospitalized at various points over the follow-up period was estimated by using Kaplan-Meier methods (25). The effects of demographic and diagnostic variables on the risk of first rehospitalization were examined by using Cox proportional hazards models (26). These longitudinal statistical methods use all available data and can accommodate "missing" and differing amounts of data across subjects and differing periods between assessments. Demographic variables were measured at baseline and included age, gender, and race (white versus not white). Additional variables included history of suicide attempts (no history, single attempt, or repeat attempts), whether youths had a history of psychiatric hospitalization before the index hospitalization, psychiatric diagnoses, and comorbid psychiatric illness. Effects were examined in both univariate and multiple-predictor models, and proportionality assumptions were tested by using Schoenfeld residuals.

Results

Rates of rehospitalization

Of the 180 adolescents enrolled in the study, 79 had at least one rehospitalization during the follow-up period. The estimated distribution of time to first rehospitalization is depicted in Figure 1, along with 95 percent confidence bands. The estimated proportion of study participants rehospitalized by six months postdischarge was 18.9 percent; by 24 months, 32.7 percent; and by 120 months (ten years), 48.5 percent. The estimated mean± SD time to first rehospitalization was 5.7±.31 years.

A number of the youths were rehospitalized more than once: 37 (21 percent) were rehospitalized once, 17 (9 percent), twice; 12 (7 percent), on three occasions; and 13 (7 percent), between four and 13 times.

Predictors of rehospitalization

The univariate and multivariate results are listed in Table 1. In the univariate analyses, older youths were less likely than younger ones to be rehospitalized. Comorbid affective and psychiatric disorders were predictive of time to first rehospitalization. No other variables were significantly related to rehospitalization.

In the full multiple-predictor model, comorbid psychiatric illness was not a significant predictor when the effects of other variables were considered, but age and presence of an affective disorder were significant.

Discussion

In this prospective, naturalistic study of adolescents after psychiatric hospitalization, we examined the rates and predictors of rehospitalization. We found that approximately half of the adolescents were rehospitalized during the follow-up period of up to ten years. Most of these hospitalizations occurred within the first two years after discharge, but a significant number of youths were not rehospitalized for several years—that is, until they reached late adolescence or early adulthood. Furthermore, our findings draw attention to two main factors that provide important information about which groups of adolescents are at risk of rehospitalization: younger youths and youths with affective disorders. No other demographic or treatment variables were significant predictors in our analysis.

Rates of rehospitalization

Few studies have examined rehospitalization rates specifically for adolescents. The six-month rehospitalization rate of 18.9 percent in our study is comparable to the rates documented in other studies of adolescents and adults of 17.6 percent (11) and 24 percent (14). The two-year rehospitaliza-

Table 1

Results of univariate and multivariate analyses of variables associated with rehospitalization among adolescents (N=180)

Variable	N	%	Univariate			Multivariate		
			Hazard ratio	95% CI	p	Hazard ratio	95% CI	p
Age (median)	14.8	—	.85	.73–.98	.022	.78	.66–.93	.004
Sex, male	89	49	1.03	.66–1.60	ns	1.07	.65–1.74	ns
Race, white	144	80	1.10	.63–1.94	ns	1.21	.68–2.15	ns
Diagnosis[a]								
Conduct disorder	73	41	1.38	.89–2.15	ns	1.67	.90–3.08	ns
Oppositional disorder	27	15	1.12	.62–2.02	ns	1.30	.62–2.71	ns
Affective disorder	97	54	1.86	1.17–2.96	.009	2.20	1.30–3.72	.003
Anxiety disorder	29	16	1.18	.66–2.11	ns	1.11	.58–2.11	ns
Substance use disorder	29	16	1.31	.74–2.30	ns	1.50	.78–2.88	ns
Comorbid psychiatric disorder	123	68	1.76	1.04–2.98	.035	.95	.48–1.88	ns
Previous suicide attempts[b]								
One	41	23	.99	.55–1.68	ns	1.24	.68–2.25	ns
Two or more	34	19	1.33	.76–2.32	ns	1.58	.87–2.86	ns
Previous hospitalizations	50	28	.97	.60–1.59	ns	.93	.56–1.55	ns

[a] The reference group is youths without the disorder.
[b] The reference group is no previous attempts.

tion rate of approximately one-third in our study is comparable to that evidenced at one year for presumably severely impaired youths hospitalized in a state psychiatric hospital (6). Despite some differences in the populations studied and the duration of the follow-up period, our study complements other studies of both adolescents and adults in documenting significant rates of rehospitalization. Because of the long follow-up period, the results of our study also highlight the fact that despite an initial high-risk period, these youths continue to be at risk of rehospitalization for many years and through young adulthood, and many are eventually rehospitalized on multiple occasions.

In this context, it is worth noting that a majority of youths in this study received outpatient aftercare services (73 percent in the first month and 92 percent overall) (23). It is possible that the intensity or types of services received by these youths was insufficient to prevent the need for rehospitalization. Nonetheless, rehospitalization may be an appropriate and effective form of treatment and should not necessarily be considered an indication of failure of treatment (9). It also is possible that in some circumstances aftercare increases the likelihood that the need for hospitalization will be identified and addressed (27).

Predictors of rehospitalization

Psychiatric disorder. The presence of an affective disorder clearly was the strongest predictor of rehospitalization. This finding is consistent with that of Asarnow and colleagues (8) that children with depressive disorders have a high risk of rehospitalization and complements Foster's (9) observation of increased risk of rehospitalization among youths with depressive disorders. It is possible that the higher rates of rehospitalization among youths with depressive disorders are related to the episodic nature and poor outcomes associated with such disorders among previously hospitalized children (8).

We did not find evidence suggesting that behavioral, anxiety, or substance use disorders increased the risk of rehospitalization. In univariate analyses, comorbid psychiatric illness appeared to be associated with greater risk of later rehospitalization, but this effect did not persist after the presence of affective disorder was controlled for in the multivariate model. Affective disorders are often associated with high rates of comorbid psychiatric illness (28). Sixty-five percent of the youths in our study who had an affective disorder had a comorbid disorder. Thus the predictive value of comorbid psychiatric illness in the univariate analysis was likely due in large part to the presence of affective disorders. Although psychiatric comorbidity was not predictive when examined in the context of other variables, it is possible that other factors related to multiplicity of psychiatric problems or symptom severity affect the risk of rehospitalization.

Suicidality. In our inpatient sample, neither one-time nor repeat suicide attempts were predictive of rehospitalization. Although these variables have been noted to distinguish between youth inpatients and other clinically referred youths (1,2), they do not appear to distinguish among youths or have predictive validity in a sample of youth inpatients with multiple stressors and impairments.

Demographic variables. Younger age at the index hospitalization was the only demographic variable related to increased risk of hospitalization in univariate and multiple predictor models. In other samples of adolescents or combined samples of adolescents and adults, findings have been inconsistent (7–9,14) regarding the relationship between age and risk of hospitalization. Although our findings need to be replicated, it is possible that youths hospitalized at younger ages are more vulnerable or receive additional inpatient treatment because of greater parental assistance in obtaining services.

Limitations

Our findings were limited by the fact that the sample was primarily Caucasian, was recruited from a single inpatient facility, and included few youths with psychotic disorders. In addition, because we were unable to verify all hospital admissions and relied on adolescents and their families for some reports of rehospitalization, it is possible that we were missing some reports of hospitalization and that some reports were inaccurate. Moreover, the adolescents were hospitalized between 1991 and 1995; since then, there have been changes in continuity of care in some communities and changes in patterns of use and lengths of stay in hospital settings.

Furthermore, it is possible that rehospitalization is related to variables that we did not not examine, such as functional impairment and symptom severity, access to alternative services, and insurance coverage. In addition, current research suggests that family factors, such as little family involvement (11) or contact with family members in the case of adult patients (10), can affect rehospitalization. It may also be important in future research to examine the sequence of events leading to rehospitalization (9). Other researchers have expressed concern about whether insufficient services after discharge can increase vulnerability to rehospitalization (6). In this study, almost all the youths eventually received outpatient aftercare services, but we did not examine the adequacy of these services.

Conclusions

Our results highlight the high rate of psychiatric rehospitalization among adolescents and the fact that younger adolescents and those with an affective disorder appear to be at the greatest risk of rehospitalization. These results may reflect the fact that younger and depressed youths have more persisting or recurrent impairment that necessitates more intensive treatment after a hospitalization. In improving services that may decrease the need for future hospitalizations among adolescents who have previously been hospitalized, clinicians and systems of care should try to proactively provide services, particularly for those who have affective disorders or are younger, so that these services are easily accessible and effective. ♦

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