

Rehospitalization of Suicidal Adolescents in Relation to Course of Suicidal Ideation and Future Suicide Attempts

Ewa K. Czyz, Ph.D., Johnny Berona, M.S., Cheryl A. King, Ph.D.

Objective: Psychiatric hospitalization is essential in the clinical management of suicidal adolescents, and a considerable number of hospitalized adolescents are rehospitalized, yet little is known about how this experience may influence postdischarge outcomes. This study examined the association between rehospitalization within three months of index hospitalization and subsequent suicide attempts and suicidal ideation among adolescents.

Methods: Participants were 373 youths (13–17 years old) hospitalized because of suicide risk, and they were followed for one year. Using Cox regression, the investigators examined rehospitalization within three months of index hospitalization as a predictor of time to suicide attempt during the subsequent nine months. Using latent-class growth modeling, they also examined whether rehospitalization predicted a change in the nine-month course of three suicidal ideation trajectories (subclinical, elevated but fast declining, and chronically elevated).

Results: Rehospitalization was associated with greater risk of suicide attempts, above the effects of key covariates. Rehospitalization also predicted distinct changes in suicidal ideation trajectories: Within the elevated–fast declining and chronically elevated groups, rehospitalization predicted increases in ideation during the follow-up, with larger magnitude for the chronic group. In contrast, rehospitalization was associated with a decrease in follow-up suicidal ideation in the subclinical group.

Conclusions: Rehospitalization predicted a more severe course of suicide ideation for most of the adolescents, but it was protective for only a smaller subgroup with subclinical levels of ideation at index hospitalization. Our findings also suggest that rehospitalization is a strong indicator of future risk of suicide attempt. These findings have important implications for intervening with rehospitalized adolescents.

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During the adolescent years, there is a significant increase in the prevalence of suicidal thoughts and behaviors (1). Approximately 16% and 8% of high school students surveyed nationally reported serious suicidal thoughts and suicide attempts, respectively, in the prior year (2). Psychiatric hospitalization can provide critical services that facilitate safety and stabilization for managing acute psychiatric symptoms and elevated suicide risk. However, a significant number of adolescents continue to experience suicide-related outcomes after discharge, including rehospitalizations, emergency department visits (3), persistent suicidal ideation, and repeated suicidal behavior (4–7). Adolescent rehospitalization rates are high: 19%–28% are rehospitalized within six months (3,8), 38% within one year (9), and up to 43% within 2.5 years after discharge (10). The risk of rehospitalization is especially elevated during the first three months after discharge (9–11). Although our understanding of the correlates of rehospitalization has expanded (8–13), less is known about the implications of this experience for

the subsequent course of suicide-related outcomes, such as suicidal ideation and suicide attempts. Consequently, further attention is warranted to examine whether rehospitalization is associated with chronic or remitting clinical trajectories among youths at high risk of suicide.

High rates of rehospitalization, particularly among suicide-related admissions (3), highlight the chronicity of psychiatric crises after discharge and raise questions about the effectiveness of hospitalization and existing aftercare interventions. Although most adolescents receive outpatient services postdischarge (14), receiving these services does not appear to be linked with significantly improved suicide-related outcomes, such as reduced likelihood of suicide attempts or decreases in suicidal ideation (6,14–16). More generally, these findings are consistent with a paucity of efficacious interventions for suicidal adolescents (17,18). Past work examining the impact of aftercare services on risk of rehospitalization has also yielded mixed findings (10,12,19). In light of the challenge of intervening with high-risk youths and the facts

that hospitalization is not intended to resolve long-standing difficulties and that premature discontinuation of outpatient treatment is common (6,20), it is not surprising that a substantial number of previously hospitalized adolescents continue to experience difficulties after being discharged (4,21).

Inpatient hospitalization is considered essential in the clinical management of acutely suicidal adolescents (22), and recent estimates indicate that inpatient admission rates for youths have been increasing (23). However, empirical data are lacking in regard to the impact on postdischarge suicide-related outcomes (18,24). We are aware of two studies examining hospitalization in relation to suicide-related outcomes (25,26); however, their findings were inconclusive. Moreover, the costs associated with psychiatric hospitalization may include financial strain, enduring stigma, and negative impact on the hospitalized individual's identity and hope for the future (27). On a broader level, hospitalization of adolescents for self-inflicted injuries costs the U.S. health care system \$615 million annually (28), necessitating an examination of these services.

The purpose of this study was to examine the extent to which rapid rehospitalization (that is, within three months of discharge) predicts suicide attempts and influences the course of suicidal ideation within a subsequent nine-month period. With the challenges of intervening with suicidal adolescents and the brevity of hospitalizations, we anticipated that rehospitalization would be associated with modest reductions in suicidal ideation and suicide attempts.

METHODS

Participants and Procedures

Participants were 373 adolescents, ages 13 to 17, who were psychiatrically hospitalized at two Midwestern hospitals because of acute suicidal ideation or a recent suicide attempt and who were followed for one year. The sample was drawn from data from a randomized clinical trial of a psychosocial intervention (29). Adolescents were eligible for inclusion if they or a parent reported on the Diagnostic Interview Schedule for Children (DISC-IV; 30) a past-month suicide attempt or suicidal ideation that was either unrelenting or accompanied by a specific plan. Exclusion criteria included cognitive impairment, transfer to other inpatient services, residence more than an hour away from study site, and absent legal guardian. Study eligibility criteria were determined on the basis of hospital admission records, and eligible adolescents were approached to participate. Legal guardians provided written informed consent, and adolescents provided informed assent to a protocol approved by the participating university's institutional review board. Data collection took place between November 2002 and December 2006. Participants were assessed within one week of hospitalization, and follow-up data were collected three, six, and 12 months later. Retention of participants was as follows: 342 (76%) participants at three months, 314 (70%) at six months, and 346 (77%) at 12 months. A more detailed

description of participant recruitment and retention has been reported previously (29).

The analytic sample consisted of participants with data on mental health services obtained within three months of discharge and at least one subsequent assessment. The analytic sample (83% of the original sample of 448, for a final sample of $N=373$) did not differ from excluded adolescents with regard to sex, age, race, use of public assistance, the predictors of interest, and suicide attempt history.

Measures

Suicidal ideation and suicide attempts. Lifetime multiple attempt status, assessed at baseline, and suicide attempts as of each of the follow-up points were assessed with suicide attempt items from the DISC-IV (30). Severity of suicidal ideation was assessed at each follow-up point with the self-reported 15-item Suicidal Ideation Questionnaire–Junior (SIQ-JR) scale (31).

Baseline psychiatric symptoms. Depressive symptoms were assessed with the Children's Depression Rating Scale–Revised (32). Hopelessness was assessed with the 20-item Beck Hopelessness Scale (33). Externalizing symptoms were assessed with the external problems subscale from the Youth Self-Report (34), which measures delinquent and aggressive behaviors. Substance use was assessed with the 18-item problem severity scale from the Personal Experience Screening Questionnaire (35,36), which measures the frequency of behaviors related to alcohol and drug abuse.

Baseline connectedness. Perception of family connectedness was measured with items from the Perceived Emotional/Personal Support Scale (37), which assesses perception of relationships as being close, confiding, satisfying, and supportive.

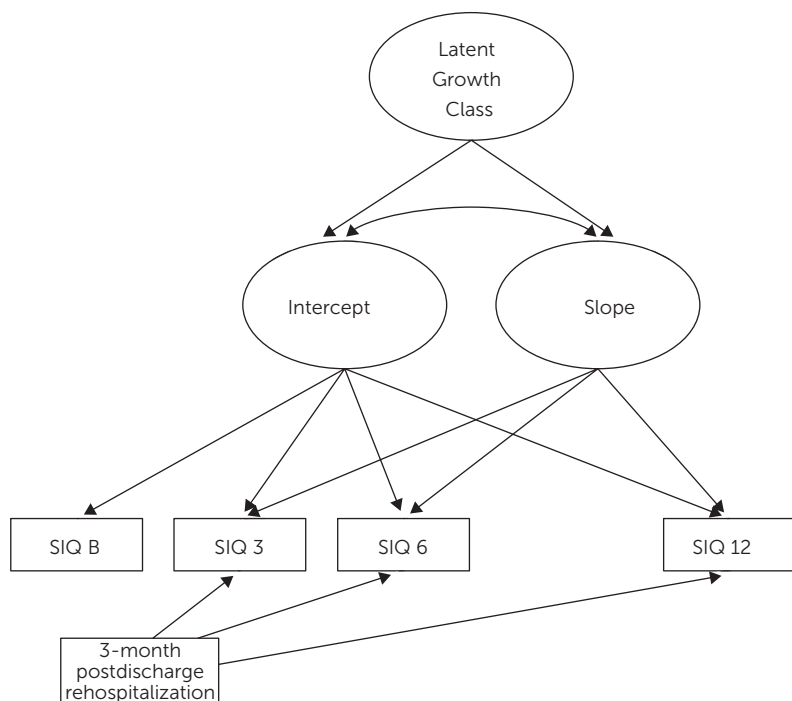
Psychiatric rehospitalization. A dichotomous variable was created (yes-no) based on two questions inquiring whether a participant was in a psychiatric hospital or a general hospital for psychiatric or emotional problems. Rehospitalization was measured within three months of index hospitalization.

Data Analysis

We used latent-class growth modeling (LCGM) and implemented it with a PROC TRAJ procedure (38) in SAS (version 9.2). We extend previous findings in which LCGM identified three suicidal ideation trajectory groups (subclinical, elevated but rapidly declining, and chronically elevated) by using the SIQ score obtained at baseline and the SIQ score at three, six, and 12 months after hospitalization (4). Using a modeling approach proposed by Jones and Nagin (39,40), we extended these analyses to examine whether rehospitalization within three months of discharge enhanced or attenuated the subsequent course of suicidal ideation trajectories, that is, SIQ assessed after the rehospitalization. The hypothesized model is shown in Figure 1.

An advantage of examining the influence of rehospitalization within multiple trajectory groups—rather than across

FIGURE 1. Hypothesized 12-month rehospitization model for adolescents with suicidal ideation^a



^aThe model depicts latent growth classes of Suicidal Ideation Questionnaire–Junior (SIQ) scores. Rehospitization between baseline (SIQ B) and month 3 (SIQ 3) is included as a predictor of the course of each trajectory after rehospitization. For graphic simplicity, only the intercept and one slope are shown.

averaged suicidal ideation for the whole sample—is the simultaneous accounting for ideation severity at hospitalization and follow-up such that differences between rehospitализed and nonrehospitализed adolescents within trajectories are minimized. We also controlled for covariates that may influence the likelihood of rehospitализation and trajectory group membership. Thus the analysis allowed for examining whether rehospitализation is associated with a different course of ideation within an otherwise similar group. [Additional details concerning data-analytic procedures are provided in an online supplement to this article.] Because the sample was drawn from an intervention study, we controlled for intervention effects; however, because it was nonsignificant and did not alter the results, intervention assignment was removed from the final model.

We examined whether rehospitализation within the first three months after baseline served to predict time to suicide attempt in the subsequent nine-month period. We controlled for key covariates and estimated a Cox proportional hazards regression in the SPSS (version 21). Number of days to suicide attempt was used as a continuous measure of time. This analysis maximizes use of data by censoring participants lost to follow-up at the last nonmissing assessment. The proportional hazards assumption was examined with the time-dependent covariates test; the interaction between the time variable and rehospitализation was not significant, suggesting that the assumption was met.

RESULTS

Sample Characteristics

Participants were predominantly female (72%, N=269) with a mean age of 15.6±1.3 years. The racial-ethnic sample composition was 83% (N=308) Caucasian, 7% (N=26) African American, 1% (N=2) Asian American/Pacific Islander, 2% (N=8) Hispanic, 1% (N=3) Native American, and 7% (N=26) “other” or not identified.

A total of 80 (21%) adolescents were rehospitализed within the first three months of index hospitalization. Rehospitализed participants tended to score higher on baseline measures of psychopathology (Table 1). Although these differences were not statistically significant, a greater proportion of boys than girls (24% versus 20%) and a greater proportion of youths with multiple suicide attempt history versus those without (25% versus 19%) were rehospitализed.

There were no differences in symptom severity between rehospitализed and nonrehospitализed adolescents within each ideation trajectory group, suggesting that clinical differences were minimized. However, rehospitализed adolescents in the elevated–fast declining trajectory (group 2) had higher externalizing scores (mean±SD=25.84±12.07) than those not rehospitализed (22.13±8.61) (p=.05). Rehospitализed adolescents in the chronically elevated trajectory (group 3) had lower externalizing scores (19.33±7.57) than adolescents who were not rehospitализed (26.10±11.79) (p=.04).

Rehospitализation and Course of Suicidal Ideation

Approximately 9% (N=11) of adolescents in the subclinical ideation trajectory (group 1; N=118), 24% (N=51) in the elevated but rapidly declining ideation trajectory (group 2; N=213), and 46% (N=18) in the chronically elevated ideation trajectory (group 3; N=39) were rehospitализed within the first three months of discharge. Table 2 describes the effects of rehospitализation as a predictor of suicidal ideation course and accounts for baseline covariates (depressive symptoms, hopelessness, externalizing problems, sex, and whether they had made multiple suicide attempts) as well as suicidal ideation severity at baseline and follow-up (ideation trajectory). Rehospitализation had a significant moderating effect for all groups. Rehospitализation was associated with significantly increasing suicidal ideation for the elevated–fast declining (group 2) and the chronic (group 3) trajectories during follow-up, with larger effects for the chronic group. Conversely, for the subclinical trajectory (group 1), the effect of rehospitализation was associated with less severe suicidal ideation during follow-up (Figure 2).

Rehospitalization and Time to Suicide Attempt

After the initial three-month period in which rehospitalization was tracked after the index hospitalization, 45 adolescents (12%) attempted suicide at least once in the subsequent nine-month period. Twenty-six (9%) of those who were not rehospitalized (N=284) attempted suicide compared with 19 (26%) of those who were rehospitalized (N=74) and who attempted suicide during this period. Reprehospitalization was significantly associated with increased risk of postdischarge suicide attempts during this nine-month period (hazard ratio=3.13, $p<.001$), even after we controlled for baseline depressive symptoms, suicidal ideation, hopelessness, externalizing problems, multiple suicide attempt history, and sex (Table 3). In additional analysis, we explored whether the effect of rehospitalization was moderated by any of the covariates. Significant interaction effects identified involved baseline suicidal ideation ($B=-.03$, $SE[B]=.02$, $p=.048$) and externalizing problems ($B=-.09$, $SE[B]=.04$, $p=.01$), suggesting that the association between rehospitalization and suicide attempts was stronger for those with more severe ideation and externalizing problems at index hospitalization.

DISCUSSION

This prospective study considered the extent to which psychiatric rehospitalization within the critical three-month period after discharge predicted suicide-related outcomes among acutely suicidal adolescents. Specifically, we examined whether there was an enduring relationship between rehospitalization and severity of suicidal ideation as well as time to suicide attempt in the subsequent nine months. We had identified three distinct profiles of adolescents characterized by differing patterns of suicidal ideation over a 12-month period after discharge wherein some adolescents followed a subclinical course of ideation, others experienced highly elevated but rapidly declining ideation, and another group had chronically elevated ideation (4). Our study extends previous findings by conducting a finer-grained examination of the influence of rehospitalization on the course of suicidal ideation while accounting for suicidal ideation severity at index hospitalization and throughout the follow-up, thus minimizing potentially confounding differences. We found that rehospitalization altered the course of suicidal ideation in

TABLE 1. Characteristics of adolescents with suicidal ideation who were or were not rehospitalized within one year of discharge

Baseline characteristic	Overall sample		Rehospitalization				p ^a
			Yes		No		
	M	SD	M	SD	M	SD	
Suicidal ideation (SIQ-JR) ^b	46.43	20.73	53.70	18.03	44.44	21.01	<.001
Depressive symptoms (CDRS-R) ^c	60.80	12.80	64.85	10.69	59.71	13.11	<.001
Hopelessness (BHS) ^d	8.74	5.79	10.41	6.07	8.29	5.64	.004
Substance abuse (PESQ) ^e	27.99	11.52	27.22	11.11	28.21	11.63	ns
Externalizing problems (YSR—external problems) ^f	21.38	9.71	23.08	11.16	20.91	9.23	.077
Family connectedness (PEPSS—Family) ^g	8.30	2.10	8.15	2.25	8.34	2.05	ns

^a Two-sample t test (two-sided). The Ns varied between 369 and 372 for the overall sample, between 289 and 293 for youths who were not rehospitalized, and between 79 and 80 for youths who were rehospitalized.

^b Suicidal Ideation Questionnaire—Junior. Possible scores range from 0 to 90, with higher scores indicating more severe suicidal ideation.

^c Children's Depression Rating Scale—Revised. Possible scores range from 17 to 113, with higher scores indicating more severe depressive symptoms.

^d Beck Hopelessness Scale. Possible scores range from 0 to 20, with higher scores indicating greater hopelessness.

^e Personal Experience Screening Questionnaire. Possible scores range from 18 to 72, with higher scores indicating more severe substance abuse.

^f Youth Self-Report—Externalizing. Possible scores range from 0 to 64, with higher scores indicating more severe externalizing problems.

^g Perceived Emotional/Personal Support Scale. Possible scores range from 1 to 12, with higher scores indicating greater family connectedness.

these three groups in distinct ways. Within the chronically elevated and elevated—fast-declining trajectory groups, rehospitalization—relative to no rehospitalization—was associated with significant increases in suicidal ideation over the follow-up. The magnitude of this effect was much larger for adolescents in the chronically elevated trajectory. In contrast, rehospitalization was associated with a decrease in suicidal ideation in the subclinical group.

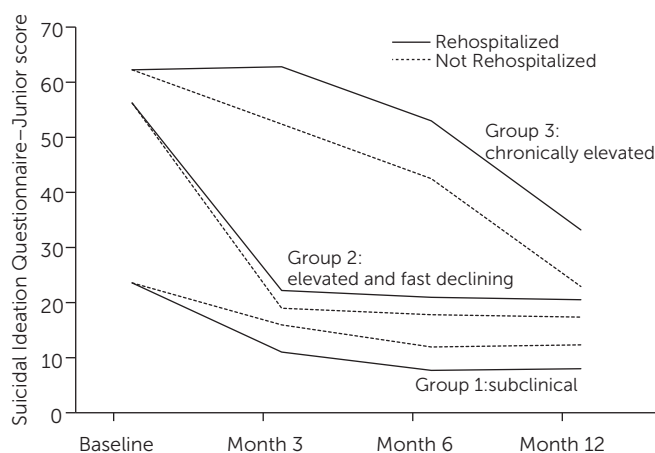
These findings highlight the importance of recognizing that acutely suicidal adolescents, although vulnerable to suicidal crises as a group, comprise a heterogeneous population where treatment decisions may interact with individual differences to yield distinct outcomes. Furthermore, for the overall sample, we found that rehospitalization was uniquely associated with earlier recurrence of suicide attempts even after taking into account baseline levels of depressive symptoms, hopelessness, externalizing behaviors, suicidal ideation, history of multiple suicide attempts, and sex. Significant interactions suggested that this association was stronger for those with more severe ideation and externalizing problems at index hospitalization. Whether

TABLE 2. Effect of rehospitalization on latent suicidal ideation trajectories of adolescents^a

Trajectory	B (rehospitalization)	SE(B)	p
Group 1: subclinical ideation	-6.08	2.89	.036
Group 2: elevated and fast declining	3.45	1.62	.034
Group 3: chronically elevated	10.52	2.85	<.001

^a N=370. Analyses adjusted for sex, multiple-attempt history, depressive symptoms, hopelessness, and externalizing problems. Controlling for number of previous hospitalizations did not change the pattern of results.

FIGURE 2. Impact of rehospitalization on trajectories of suicidal ideation among adolescents^a



^a Possible scores range from 0 to 90, with a published clinical cutoff score of 31. The analysis adjusted for baseline depressive symptoms, hopelessness, externalizing problems, history of multiple suicide attempts, and sex. Controlling for number of previous hospitalizations did not change the pattern of the results.

cause or consequence, rehospitalization in this population is a clinical indicator of the severity and chronicity of suicide risk. It was strongly associated with recurrence of suicide risk in the form of elevated suicidal ideation as well as suicide attempts.

There are a number of potential explanations for the relationships found here. First, results are consistent with past findings highlighting the chronic nature of suicide risk (5,7) as well as the limited efficacy of interventions to prevent severe suicidal ideation and suicide attempts (17,18,41). A recent nationally representative study found that a majority of suicidal adolescents were receiving mental health services before the onset of suicidal behavior (1). With these findings in mind, it is less surprising that rehospitalization was not uniformly associated with lower risk among acutely suicidal youths after discharge.

Second, psychiatric hospitalization may have iatrogenic effects for a subset of suicidal adolescents. As has been argued by Linehan (42), the attentive responsiveness to reported suicidal ideation or self-injury that characterizes hospitalization may act as an unintended reinforcement of

self-harmful behaviors. Moreover, hospitalization may disrupt the positive aspects of some suicidal adolescents' lives, such as positive peer or family relationships and age-appropriate engagement in social activities. At the same time, acknowledging that interpersonal factors may also serve as risk factors is important. For example, disengaged parent-child relationships have been identified as a contributor to rehospitalization (11). Hospitalization may also unintentionally exacerbate hopelessness (failed outpatient treatment) or contribute to an identity as an "ill" person or someone with low self-efficacy for coping and benefiting from treatment. However, given that this was a naturalistic study, drawing conclusions about iatrogenic effects would be premature; instead, it may be more fitting to describe rehospitalization as a marker of chronicity of risk. In addition, although psychiatric hospitalization is critical to the treatment of acutely suicidal adolescents (22), its goals are often constrained to maintaining safety and facilitating linkage to appropriate outpatient services rather than to remission of psychopathology and significant modification of the environmental context. Consequently, some of the relevant precipitants of crisis may be too long-standing to be addressed within the course of hospitalization.

Nevertheless, the fact that rehospitalization was prospectively associated with a more severe course of suicide ideation and a more imminent risk of suicide attempts is of concern. Moreover, because rehospitalization was associated with a more pronounced increase in suicidal ideation in the chronically elevated ideation group, it is possible that rehospitalization may especially negatively affect adolescents at chronic risk of self-harm. This is consistent with the hypothesis that hospitalization may be clinically contraindicated for some forms of psychopathology, such as borderline personality disorder, because it may unintentionally reinforce suicide-related behaviors (42). However, we did not assess personality disorders in our study, and thus this inference warrants caution.

The predominantly female and Caucasian sample has limited generalizability to other adolescent groups. The strength of our conclusions is especially tempered by the fact that examining the relationship between rehospitalization and suicide-related outcomes in a naturalistic study does not

TABLE 3. Cox regression model predicting time to suicide attempt among adolescents^a

Variable	B	SE(B)	Hazard ratio	95% CI	p
Male (reference: female)	-.050	.36	.95	.47-1.91	ns
Multiple attempts (reference: no)	.560	.31	1.75	.95-3.22	.074
Suicidal ideation	.002	.01	1.00	.98-1.02	ns
Depressive symptoms	.010	.01	1.01	.98-1.03	ns
Hopelessness	-.010	.03	.99	.94-1.06	ns
Externalizing problems	-.020	.02	.98	.95-1.02	ns
Rehospitalization (reference: no)	1.140	.32	3.13	1.66-5.89	<.001

^a N=352. Controlling for number of previous hospitalizations did not change the pattern of results.

allow for ruling out the possibility that findings may be influenced by factors for which we were not able to account (including health insurance coverage, outpatient providers' risk management practices, readmission psychiatric status, emotional liability, and impulsive aggression). Although controlling for key covariates in this study minimized this possibility, future work should consider other factors. Another factor that warrants closer consideration is the role of aftercare services. Specifically, we were not able to establish the temporal relationship between rehospitalization and delivery of aftercare services.

However, participation in services was high during the first three months after discharge (only 4% of the sample did not attend any sessions), and controlling for number of sessions attended did not affect results reported here. Rehospitalized youths generally attended more sessions within this period compared with youths who were not rehospitalized. Future studies should examine aftercare services in greater detail to assess their impact on posthospitalization trajectories, including youths' adherence to these services. Finally, the retrospective recall of dates of attempts at follow-up assessments is another important limitation. Despite these limitations, this study has addressed an important gap in the literature and has important strengths, including a large sample of acutely suicidal adolescents and prospective design.

CONCLUSIONS

To our knowledge, this is the first prospective study examining the link between rehospitalization and suicide-related outcomes among suicidal adolescents. Our findings suggest that rehospitalization shortly after discharge is a significant event. For most adolescents, rehospitalization was associated with a more severe course of suicidal ideation; for a smaller subgroup reporting subclinical ideation at index hospitalization, it was protective. Rehospitalization may be a significant vulnerability factor, signaling increased suicide attempt risk. Although these results raise questions about possible iatrogenic effects of rehospitalization, without understanding the mechanisms accounting for the associations found here, firm conclusions are premature. Given the exploratory nature of the analytic approach utilized (LCGM) and the inability to consider all possibly pertinent covariates (including adequately accounting for the role of aftercare services), cross-validation and replication of findings are necessary. However, our findings have implications for intervening with readmitted adolescents, including the need for posthospitalization services, addressing potentially self-defeating cognitions about hospitalization, and addressing realistic expectations with adolescents and families. More studies are needed to investigate further how and why rehospitalization influences these youths' posthospitalization functioning. Studying adolescents' subjective experiences may help clarify why rehospitalization is associated with increased vulnerability to suicidal crises.

AUTHOR AND ARTICLE INFORMATION

The authors were with the Department of Psychiatry and Department of Psychology, University of Michigan, Ann Arbor, at the time of the study (e-mail: ewac@umich.edu). Dr. Czyz is now with the Department of Psychiatry at the university.

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