

# Reduction of Postdischarge Suicidal Behavior Among Adolescents Through a Telephone-Based Intervention

Manivel Rengasamy, M.D., and Garrett Sparks, M.D.

**Objective:** Brief telephone follow-up for a patient with suicidal tendencies after he or she has been discharged from an emergency room or hospital has been shown to decrease subsequent suicide attempts. However, despite the high rate of suicidal behavior in adolescents, this intervention has not been examined in this population. As part of a quality improvement intervention, postdischarge telephone contacts were used to attempt to reduce suicidal behavior and inpatient rehospitalizations among adolescents.

**Methods:** Adolescents who were hospitalized for suicidal ideation or attempt (N=142) were randomly assigned to one of two telephone interventions delivered over a 90-day period: either a single call intervention (SCI) or a multiple calls intervention (MCI). The intervention consisted of assessment of suicidality, review of safety plan, and discussion of medication and weapon safety, with up to six telephone contacts in the MCI and up to one contact in the SCI. Primary outcome measures included suicidal behavior and inpatient

rehospitalizations; secondary outcome measures included adolescents' confidence in their safety plan.

**Results:** Adolescents receiving the MCI had a significantly lower rate of suicidal behavior (6%) compared with adolescents receiving SCI (17%; odds ratio [OR]=0.28,  $p=0.037$ ); results persisted while the analysis controlled for relevant covariates (OR=0.25,  $p=0.032$ ). Similarly, adolescents receiving the MCI reported significantly greater confidence in their safety plan at 90 days (95% vs. 74%;  $p=0.001$ ), which, in turn, was associated with a lower rate of suicidal behavior (OR=0.95,  $p=0.019$ ).

**Conclusions:** A telephone-based intervention for providing recurrent follow-up soon after discharge is feasible in the adolescent population and may be effective in reducing postdischarge suicidal behavior.

*Psychiatric Services* 2019; 70:545–552; doi: 10.1176/appi.ps.201800421

Despite advances in mental health treatment for youths and adolescents over the past half-century, mortality data from the Centers for Disease Control and Prevention indicate that suicide ranks as the second leading cause of death in youths and adolescents (1). Suicide risk is particularly elevated in the postdischarge period following an inpatient psychiatric hospitalization, with increased suicide rates for those with affective disorders (2–4). The latest meta-analysis examining postdischarge suicide risk found that patients with a hospital admission for suicidal thoughts or behaviors had a particularly elevated three-month postdischarge suicide risk of up to 100-fold greater than the general global rate (5). Similarly, a recent cohort study found that suicides in the first year after discharge from the hospital may account for up to 24% of all suicides (6).

Community studies have suggested that between 3.4% and 5.4% of suicide attempters eventually die by suicide, making reduction of suicide attempts a critical treatment target (7). In adults, it has become increasingly popular to use brief telephone-based interventions to target suicide attempt reduction after discharge, given the high

cost-effectiveness of these interventions (8, 9). In the World Health Organization's Multisite Intervention Study on Suicidal Behaviours (SUPRE-MISS) trial, adult suicide

## HIGHLIGHTS

- The postdischarge period from the inpatient psychiatric hospital is a high-risk period for suicide attempts.
- Brief postdischarge telephone-based interventions have been effective in reducing suicide attempts in adults, although such interventions have not been done in the adolescent population.
- Adolescents receiving a recurrent postdischarge telephone-based intervention had higher confidence in their safety plan compared with adolescents receiving a single telephone intervention.
- Adolescents randomly assigned to a recurrent postdischarge telephone intervention had a significantly lower rate of suicidal behavior compared with adolescents randomly assigned to a single postdischarge telephone intervention.

attempters randomly assigned to an 18-month postdischarge telephone-based intervention had a reduction in suicide completions (10, 11). Similarly, several recent large studies have suggested a reduction of 5% to 8% in suicide attempts among patients who received brief telephone interventions soon after discharge from the emergency department after a suicide attempt, with such interventions focusing on the first four months after discharge (12–15).

Despite the abundance of data for effective postdischarge interventions in the adult literature, there are no extant studies that demonstrate efficacy in adolescents (16, 17). Although text- or Web-based interventions have shown promise in recent pilot studies in reducing suicidal behaviors, no large text- or Web-based intervention studies exist demonstrating replicability or efficacy (18, 19). Psychotherapy interventions, such as cognitive-behavioral therapy or dialectical behavior therapy, may be effective at reducing suicide attempts in adolescents in the postdischarge period, but lack of availability of trained therapists and intervention costs limit widespread use (20, 21). Additionally, even when high-quality treatment is delivered, suicidal youths make attempts early in outpatient treatment, before the outpatient therapy can take effect (4).

Therefore, we sought to implement a brief telephone-based follow-up intervention for adolescents discharged from an inpatient psychiatric unit, with a recent French study demonstrating feasibility of a telephone-based intervention for adolescents (22). As part of a quality improvement project intervention, we randomly assigned adolescents who were admitted to inpatient psychiatric units for suicidal ideation or attempt into a multiple calls intervention (MCI) with multiple postdischarge phone contacts or a single call intervention (SCI) with a single postdischarge phone contact to assess effects of these brief interventions on suicidal behavior and psychiatric hospital readmissions over a 90-day period.

## METHODS

### Study Design

As part of our local quality improvement project (Kids Offered Neuropsychiatric Guidance [KONG]), we conducted the intervention with 142 adolescents between 12 and 18 years old who were admitted to two of our inpatient child and adolescent psychiatric units for suicidal ideation or attempt. As our health system's flagship psychiatric hospital, our hospital provides inpatient mental health care services to greater than one million patients located primarily in the Pittsburgh metropolitan area. We did not include patients who were discharged to a longer-term care facility (residential treatment facility, juvenile detention center), were transferred to another hospital or other psychiatric unit, were placed exclusively under the care of child protective services, were readmitted within 12 hours of discharge, or lacked follow-up contact information. We included participants who were in the project between September 8, 2017, and January 12, 2018.

Participants were identified by daily medical record census examination or notification by inpatient staff. We used a quasi-randomized design based on alternating assignment of adolescents (based on date of discharge) to the MCI (involved six phone contacts over a three-month period) or the SCI (involved one phone contact over a three-month period). Participant assignment was stratified by reason for admission (suicide ideation or behavior) and intervention recipient (solely parent or parent and child). In some cases, adolescents who were hospitalized declined to receive the outpatient intervention, resulting in intervention administration to just the parents. Adolescents concurrently received treatment as usual, including services such as partial hospitalization. Ultimately, 70 participants were included as part of the SCI, whereas 72 participants were included as part of the MCI (see online supplement).

Our project was approved by our hospital's quality improvement review committee, and thus this project did not require institutional review board approval. Verbal consent was obtained from both the participants and their guardians.

### Study Intervention

After identification of patients, the quality improvement project staff administered the Columbia Suicide Severity Rating Scale (C-SSRS) up to 3 days before discharge from the inpatient psychiatric unit. On the day of discharge, patients were randomly assigned into the MCI or SCI. The intervention was based on previously described adult studies. Four members of the child psychiatry house staff then administered the intervention (requiring master's-level education) to participants. Training for the intervention was done by the primary author, took less than 1 hour, and involved provision of an intervention telephone script and role-playing of an intervention call (see online supplement). The MCI consisted of attempted telephone calls at approximately 1, 7, 14, 30, 60, and 90 days postdischarge (time points 1–6, respectively), whereas the SCI consisted of an attempted telephone call at approximately 90 days postdischarge (time point 6).

The telephone intervention consisted of a 10- to 20-minute phone call to participants and guardians. The phone call with guardians generally consisted of review of parental concerns of suicidality and concerns related to treatment follow-up. The intervention with adolescents generally consisted of review of assessment of suicidality via the C-SSRS; review of the safety plan (based on the National Suicide Prevention Lifeline's safety plan); assessment of the adolescent's confidence in the safety plan, short- and long-term goals, and helpfulness of the intervention; and elicitation of reasons for living (23). Both guardian and participant interventions included assessment at select time points of global well-being, medication and weapon safety (asking participants and families to lock all guns and medications), and perceived helpfulness of the intervention. For both guardian and participant interventions, problem solving related to logistical or medication concerns, appropriate safety education, and referral information for suicide hotlines and outpatient services were provided.

Participants were then contacted for intervention at the designated time points, generally between 4 p.m. and 8 p.m. on weekdays. If participants were reached, the intervention was conducted. If not, a voice mail was left, and participants or guardians were generally recontacted with one phone contact in the following week, with up to two additional voice mails left. If participants or guardians were reached but unavailable for intervention, then this protocol was restarted. The intervention was conducted on an intent-to-treat basis starting from index hospital discharge. If patients described active suicidality, we planned to use an adapted version of the Procedures for Managing Suicidality in the National Institute of Mental Health Treatment of Adolescent Depression Study manual. However, no such interventions were required.

### Outcomes and Covariates

The primary a priori outcomes were suicidal behavior (defined as interrupted, aborted, actual, and completed attempts as per the Columbia Classification Algorithm of Suicide Assessment) and inpatient rehospitalization at 90 days post-randomization, as abstracted from the health record as well as patient or family report (24). Participants were considered to have suicidal behavior if any source described evidence of suicidal behavior. Secondary outcomes included initial follow-up with providers, confidence in the safety plan, and perceived helpfulness of the intervention. All outcome measures and covariates were based on systemic medical record examination, participant or guardian report, and provider report. Our electronic medical record provides access to a multiprovider health information exchange, collating medical records from participating hospitals located up to 130 miles away from our primary psychiatric hospital.

Covariates included age, patient-identified gender, ethnicity, discharge level of care, duration of hospitalization, diagnosis, prior suicide attempts, and prior hospitalizations. Diagnosis was determined by judgment of the primary study author on the basis of diagnoses recorded in the discharge summary and the most recent inpatient note. Discharge level of care was designated as either “high” (receiving partial hospitalization, intensive outpatient, or family-based services) or “low” (seeing a stand-alone psychiatrist or therapist or no services). Duration of hospitalization was used as a gross proxy of illness severity. Initial therapy follow-up was determined from the medical record and attempted contact with providers. To determine safety plan confidence, adolescents were asked to rate their confidence in using their safety plan (if needed) on a scale ranging from 0% to 100%. Helpfulness of the intervention was identified as “yes” or “no,” with coding of neutral response as a “no.” Baseline C-SSRS scores were not included in analyses, given that we were only able to obtain them for 39% (N=56) of our sample.

### Statistical Analysis

Data were analyzed with SPSS, version 25 (25), and the statistical language R, version 3.5.1 (26). We conducted univariate analysis by using linear regression for continuous

outcome measures and logistic regression for binary outcome measures. The identified covariates were then combined into a multivariate model to determine the most parsimonious set of variables. We also analyzed time to suicidal behavior after discharge with survival analysis, with censorship of those without suicidal behavior at 90 days after randomization. A comparison of the cumulative incidence of suicidal behavior was estimated by the Kaplan-Meier product limit method, with comparison of groups using the log-rank and Wilcoxon tests. Cox proportional hazard regression analyses were performed to model the effects of intervention type (MCI or SCI), age, gender, ethnicity, and covariates on time to suicidal behavior. Given that no significant covariates were identified at the univariate level, multivariate Cox models only included intervention type and demographic characteristics.

Given the limited sample size (N=44), we were only able to examine a basic linear regression model examining whether suicidal behavior status and intervention group predicted confidence in the safety plan, with similar results when excluding those with suicidal behavior in the intervention timeframe. Similarly, logistic regression analysis involving suicidal behavior status as an outcome and confidence in safety plan as a predictor was limited in sample size (N=44). Sensitivity analyses individually adding in demographic variables did not affect the results.

Analysis included participants on a modified intent-to-treat basis (excluding participants who were randomly assigned erroneously) (see online supplement). Sensitivity analysis including participants on an intent-to-treat basis, including only suicidal behavior reported in the medical record, or using biological gender, did not affect associations in any final Cox or logistic regression models. All tests were two-tailed, with  $p < 0.05$  considered statistically significant.

## RESULTS

### Demographic and Baseline Characteristics

The sample consisted of 142 adolescents with a mean  $\pm$  SD age of  $15.0 \pm 1.6$  and who were mostly female (70%). The sample's racial-ethnic composition (N=141) was Caucasian (74%), African American (N=31, 22%), Asian (N=4, 13%), and Native American (N=2, 1%). They were typically hospitalized for a mean of  $6.9 \pm 3.6$  days, admitted for suicidal ideation (64%), and discharged to a high level of care (57%). According to medical record and patient report, 64% of patients had a prior suicide attempt, and 37% had a prior inpatient psychiatric hospitalization. There were no significant differences in any demographic or baseline characteristics between the MCI and SCI groups (Table 1).

Phone contact was made to 39% (N=27) of adolescents and 57% (N=40) of guardians in the SCI. In the MCI, 72% (N=52) of adolescents received at least one phone contact, 32% (N=23) received one to two phone contacts, and 40% (N=29) received three or more phone contacts, with no observable dose-response relationship. For parents in the MCI,

**TABLE 1. Baseline demographic and clinical characteristics of participants in the multiple calls intervention (MCI) and the single call intervention (SCI)**

Characteristic	Overall (N=142)		MCI (N=72)		SCI (N=70)		$\chi^2$ <sup>a</sup>	t <sup>b</sup>	p
	N	%	N	%	N	%			
Demographic									
Female	99	70	48	67	51	73	.64		.422
Age (M $\pm$ SD)	15 $\pm$ 1.6		15 $\pm$ 1.6		15.1 $\pm$ 1.6			-.26	.794
Non-Caucasian race <sup>c</sup>	37	26	18	25	19	27	.08		.771
Clinical									
Discharge to high level of care	81	57	36	50	45	64	2.96		.086
Duration of hospitalization (M $\pm$ SD days)	6.9 $\pm$ 3.6		6.5 $\pm$ 2.7		7.3 $\pm$ 4.4			-1.21	.228
Admitted for suicidal ideation	91	64	44	61	47	67	.56		.454
Prior suicide attempt	89	64	40	58	49	70	2.18		.140
Prior hospitalization	52	37	25	35	27	39	.29		.588
Diagnosis									
Major depressive disorder	89	63	44	61	45	64	.15		.696
Depressive disorder <sup>d</sup>	29	20	14	19	15	21	.09		.769
ADHD	30	21	18	25	12	17	1.31		.252
ODD or CD <sup>e</sup>	11	8	5	7	6	9	.13		.717
GAD <sup>f</sup>	15	11	6	8	9	13	.77		.381
Anxiety	26	18	16	22	10	14	1.49		.221
Substance use disorder	17	12	7	10	10	14	.70		.402
Borderline personality disorder <sup>g</sup>	7	5	4	6	3	4			1.00
PTSD	24	17	15	21	9	13	1.61		.205
Physical abuse	16	11	7	10	9	13	.35		.555
Sexual abuse	31	22	18	25	13	19	.86		.354
Other trauma <sup>h</sup>	17	12	11	15	6	9	1.51		.218

<sup>a</sup> df=1.<sup>b</sup> df=140.<sup>c</sup> Total N=141.<sup>d</sup> Indicates a diagnosis of depressive spectrum disorder not including major depressive disorder (persistent depressive disorder or unspecified depressive disorder).<sup>e</sup> ODD, oppositional defiant disorder; CD, conduct disorder.<sup>f</sup> Generalized anxiety disorder.<sup>g</sup> Includes "rule-out" borderline personality disorder diagnosis or borderline traits as per assessment (clinicians indicated that the patient might have borderline personality traits or had a provisional [e.g., rule-out] diagnosis of borderline personality disorder). No test statistic is presented because the comparison used Fisher's exact test.<sup>h</sup> Indicates nonphysical or nonsexual trauma (such as experiencing a car accident).

85% (N=61) received at least one phone contact, 24% (N=17) received one or two phone contacts, and 61% (N=44) received three or more phone contacts.

### Primary Outcomes

**Suicidal behavior and inpatient rehospitalizations.** Overall, 16 participants (11%) had suicidal behavior within 90 days, without any deaths by suicide. Patients in the recurrent intervention had fewer incidents of suicidal behavior (6%) compared with patients in the SCI (17%) (odds ratio [OR]=0.28, 95% confidence interval [CI]=0.09–0.93,  $p=0.037$ ). No difference existed for inpatient rehospitalization rates between the MCI (15%) and SCI (19%). Table 2 describes outcome differences between intervention arms.

**Univariate analysis.** Predictors of suicidal behavior in univariate logistic regression analyses included high discharge level of care (OR=6.16, 95% CI=1.35–28.25,  $p=0.019$ ), diagnosis of major depressive disorder (OR=4.76, 95% CI=1.04–21.84,  $p=0.045$ ), and younger age (OR=0.66, 95% CI=0.47–0.92,  $p=0.014$ ). Gender, race, prior suicide attempt,

prior inpatient hospitalization, other psychiatric diagnoses, reason for admission (suicidal ideation or behavior), and duration of hospitalization were not significant predictors of suicidal behavior (Table 3). Adolescent participants who initially opted out of the intervention (N=7) did not differ on intervention assignment or the outcome of suicidal behaviors, compared with adolescents who did not opt out.

Kaplan-Meier analysis demonstrated that participants in the SCI had a higher risk of suicidal behavior after discharge compared with the MCI participants (incidence rate ratio=3.73; log-rank  $\chi^2=4.4$ , df=1,  $p=0.036$ ; Wilcoxon  $\chi^2=4.32$ , df=1,  $p=0.038$ ).

**Multivariate analysis.** With multivariate logistic regression analysis, presence of major depressive disorder emerged as an additional predictor of increased risk of suicidal behavior after discharge (OR=5.75, 95% CI=1.1–29.5,  $p=0.036$ ). Patients in the MCI had significantly fewer incidents of suicidal behavior than those in the SCI at 90 days after the analyses controlled for age, gender, ethnicity, and major depressive disorder diagnosis (OR=0.25, 95% CI=0.07–0.89,

**TABLE 2. Differences in outcomes among participants in the multiple calls intervention (MCI) and the single call intervention (SCI)<sup>a</sup>**

Outcome	Overall (N=142)		MCI (N=72)		SCI (N=70)		$\chi^2$ <sup>b</sup>	t <sup>c</sup>	p
	N	%	N	%	N	%			
Suicidal behavior	16	11	4	6	12	17	4.77		.029
Safety plan confidence (M $\pm$ SD %) <sup>d</sup>	82.98 $\pm$ 23.3		95.37 $\pm$ 12.1		73.56 $\pm$ 25.51			3.76	<.001
Inpatient rehospitalization	24	17	11	15	13	19	.27		.601
Duration of rehospitalization (M $\pm$ SD days) <sup>e</sup>	12.64 $\pm$ 7.7		14 $\pm$ 10.6		11.63 $\pm$ 5.1			.51	.628
Initial therapy appointment attendance <sup>f</sup>	98	81	48	81	50	81	.01		.921
Emergency department or crisis encounter	19	13	8	11	11	16	.60		.440

<sup>a</sup> Outcomes were measured 90 days after randomization to MCI (time point 6) or SCI.

<sup>b</sup> df=1.

<sup>c</sup> df=140.

<sup>d</sup> Ns are as follows: overall (N=44), MCI (N=19), SCI (N=25). Adolescents rated their confidence in using their safety plan (if needed) on a scale ranging from 0% to 100%.

<sup>e</sup> Ns are as follows: overall (N=14), MCI (N=6), SCI (N=8).

<sup>f</sup> Ns are as follows: overall (N=121), MCI (N=59), SCI (N=62).

p=0.032; Table 4). With Cox regression analysis, patients receiving the SCI had a nearly fourfold higher risk of suicidal behavior compared with the MCI sample after the analyses controlled for demographic covariates (hazard ratio [HR]=0.27, 95% CI=0.07–0.99, p=0.048) [see online supplement]. Between the SCI and MCI groups, no differences existed in time until rehospitalization while the analyses controlled for demographic covariates (HR=0.69, p=0.38).

### Secondary Outcomes

Patients' mean confidence in their safety plan at the final 90-day time point was found to be significantly higher in the MCI (95.4% $\pm$ 12.1%) compared with the SCI (73.6% $\pm$ 25.5%;  $\beta$ =21.81, 95% CI=9.0–34.6, p=0.001). On an exploratory basis, the confidence in the safety plan was the only significant predictor of suicidal behavior status in a logistic regression model that included intervention type (OR=0.95, 95% CI=0.91–0.99, p=0.019).

More than 70% of both adolescents and parents generally found the intervention helpful across time points (see online supplement). No differences existed in therapy follow-up attendance percentages between the MCI (81%, N=48) and SCI (81%, N=50; p=0.921).

## DISCUSSION

During a local quality improvement project, we found that a recurrent telephone-based intervention consisting of six phone calls over 90 days (MCI) was effective in reducing adolescent suicidal behavior in the postdischarge period compared with a single telephone-based intervention at 90 days (SCI). Participants in the MCI were approximately four times less likely to have suicidal behavior compared with their peers in the SCI. To our knowledge, this intervention is the only published randomly assigned post-discharge telephone intervention designed to reduce pediatric suicidal behavior and is one of a few brief interventions of any kind developed for pediatric populations.

Our findings confirm the previously reported feasibility of a telephone-based intervention for the adolescent population and suggest that the intervention was found helpful by most of the adolescents. Our findings of an 11-percentage-point reduction in suicidal behavior with the MCI extend the results of recent larger adult studies showing that an early, brief intervention is effective in reducing suicide. Particularly, the use of early follow-up (at least two contacts in the month after discharge) and repeated follow-up telephone attempts (three to six time point attempts) appears to distinguish these studies from other studies that failed to find efficacy of a telephone-based intervention. In our intervention, either the larger number of calls or the fact that the intervention occurred soon after discharge may have contributed to a reduction in suicidal behavior in the MCI group.

Although our intervention was comparable with prior adult interventions, notable differences included the focus of the intervention on the safety plan, emphasis on medication and weapon safety, and application of the intervention to patients who were admitted for both suicidal ideation and suicide attempt. On an exploratory basis, we found that our intervention was associated with an increase of approximately 20 percentage points in patient confidence in the safety plan and that confidence in the safety plan was highly associated with suicidal behavior. Perhaps a telephone-based intervention focusing specifically on the safety plan or reducing medication and weapon accessibility can augment treatment effects on suicide attempt reduction (27, 28).

Consistent with prior research, a diagnosis of major depressive disorder was associated with suicidal behavior in the intervention time frame. Younger age was associated with suicidal behavior status, which contrasts with some of the extant literature, but such differences may be due to our small sample, selection bias (hospitalization at a younger age may be a proxy for illness severity), or differences in suicide risk factors between adolescents with suicidal ideation and the population at large (29, 30). However, a large



**TABLE 3. Association between patient characteristics and outcomes with suicidal behavior after hospital discharge<sup>a</sup>**

Characteristic or outcome	Overall (N=142)		Suicidal behavior (N=16)		Without suicidal behavior (N=126)		$\chi^2$ <sup>b</sup>	t <sup>c</sup>	p
	N	%	N	%	N	%			
Demographic characteristic									
Age (M±SD)			14.06±1.39		15.16±1.61			−2.60	.010
Female	99	70	14	88	85	67			.148
Non-Caucasian race <sup>d</sup>	37	26	3	19	34	27			.562
Clinical characteristic									
Admitted for suicidal ideation	91	64	12	75	79	63	.93		.334
Prior hospitalization	52	37	6	38	79	63	.003		.956
Discharge to high level of care	81	57	14	88	67	53	6.83		.009
Hospitalization duration (M±SD days)			8.29±3.23		6.72±3.66			1.63	.104
Prior suicide attempt	89	64	10	63	79	64	.02		.890
Major depressive disorder	89	63	14	88	75	60	4.75		.029
Depressive disorder <sup>e</sup>	29	20	1	6	28	22			.193
ADHD	30	21	2	13	28	22			.523
ODD or CD <sup>f</sup>	11	8	1	6	10	8			1.000
GAD <sup>g</sup>	15	11	1	6	14	11			1.000
Anxiety	26	18	4	25	22	17			.494
Substance use disorder	17	12	2	13	15	12			1.000
Borderline personality disorder <sup>h</sup>	7	5	1	6	6	5			.575
PTSD	24	17	2	13	22	17			1.000
Physical abuse	16	11	3	19	13	10			.392
Sexual abuse	31	22	5	31	26	21			.343
Other trauma <sup>i</sup>	17	12	4	25	13	10			.103
Outcome									
Inpatient rehospitalization	24	17	10	63	14	11			<.001
Initial therapy appointment attendance	98	81	14	88	84	80			.734
Confidence in using safety plan at 90-day time point (M±SD %) <sup>j</sup>	82.98±23.3		55.43±31		88.19±17.7			−2.71	.031

<sup>a</sup> No test statistic was presented for comparisons with Fisher's exact test.<sup>b</sup> df=1.<sup>c</sup> df=140.<sup>d</sup> Total N=141.<sup>e</sup> Indicates a diagnosis of depressive spectrum disorder not including major depressive disorder (persistent depressive disorder or unspecified depressive disorder).<sup>f</sup> ODD, oppositional defiant disorder; CD, conduct disorder.<sup>g</sup> Generalized anxiety disorder.<sup>h</sup> Includes "rule-out" borderline personality disorder diagnosis or borderline traits as per assessment (clinicians indicated that the patient might have borderline personality traits or had a provisional [e.g., rule-out] diagnosis of borderline personality disorder).<sup>i</sup> Indicates nonphysical or nonsexual trauma (such as experiencing a car accident).<sup>j</sup> Ns are as follows: overall (N=44), multiple (N=19), single (N=25). Adolescents rated their confidence in using their safety plan (if needed) on a scale ranging from 0% to 100%.

longitudinal study of adolescents who attempted suicide found that younger age predicted suicide reattempts, and other studies have suggested that the transition from ideation to attempt occurs within the first one to two years of ideation onset, which may have been more applicable for our more severely ill cohort of younger patients (31, 32). No differences were found between MCI and SCI groups in regard to inpatient psychiatric rehospitalization rates. This negative finding may be because rehospitalizations are often indicative of worsening psychopathology, psychosocial crises, or suicidal ideation, whereas our intervention primarily focused on preventing the transition from suicidal ideation to attempt. Similarly, initial follow-up appointment attendance between the MCI and SCI was comparable, likely secondary to the high initial follow-up rates (>80%) of both groups.

However, there were several limitations of our intervention and analysis. First, our sample size was small, even though the sample was strongly representative of the adolescent psychiatric population of interest. Second, we were unable to contact all families to assess the presence of suicidal behavior. However, several prior studies used the medical record for exclusive assessment of suicide attempt, and our sensitivity analyses—exclusively using the medical record—demonstrated similar results. We also used an electronic medical record with access to multiple health care systems. Third, we did not use a "true" randomization schema for intervention assignment. However, the likelihood of assignment bias was low, given that patients who were appropriate for intervention were identified before discharge. Last, we did not have a baseline suicide severity for most of our sample. However, given that no

**TABLE 4. Predictors of suicidal behavior after hospital discharge among participants in the multiple calls intervention (MCI) and the single call intervention (SCI)<sup>a</sup>**

Predictor	$\beta$	SE	e <sup><math>\beta</math></sup>	p
MCI (reference: SCI)	−1.381	.645	.251	.032
Age	−.538	.199	.584	.007
Female (reference: male)	1.148	.854	3.152	.179
Major depressive disorder diagnosis (reference: no major depressive disorder diagnosis)	1.749	.833	5.748	.036
Non-Caucasian (reference: Caucasian)	−1.061	.770	.346	.168

<sup>a</sup> Results are from a logistic regression analysis that controlled for age, gender, and race-ethnicity.

differences in suicide risk factors (demographic characteristics and prior suicide attempts) existed between intervention arms, illness severity between intervention arms likely did not influence our results.

## CONCLUSIONS

In summary, our quality improvement intervention suggests that repeated delivery of an early, brief telephone-based intervention in the postdischarge period after an inpatient psychiatric hospitalization can be effective in reducing adolescent suicidal behavior. Such interventions may increase long-term confidence in safety plans, and higher confidence in safety planning may be associated with decreased likelihood to attempt suicide. This intervention extends the current literature on brief interventions and addresses the dearth of brief postdischarge interventions for reducing suicidal behavior in the pediatric population. Given the urgent need for effective treatments to reduce adolescent suicides, cost-effective and telephone-based, postdischarge interventions should be evaluated in larger trials.

## AUTHOR AND ARTICLE INFORMATION

Western Psychiatric Hospital, University of Pittsburgh Medical Center, Pittsburgh. Send correspondence to Dr. Rengasamy (rengasamym@upmc.edu).

The authors acknowledge Jane Phelps-Tschang, Amanda Downey, Monique Simpson, Carrie Wiersma, and James Tew for their valued assistance in intervention implementation and development. They also thank David Brent and Giovanna Porta for their counsel and assistance in manuscript review and acknowledge the staff of the Western Psychiatric Hospital third-floor unit for their support and work in intervention implementation.

The authors report no financial relationships with commercial interests.

Received September 8, 2018; revision received December 24, 2018; accepted January 25, 2019; published online April 5, 2019.

## REFERENCES

- Web-Based Injury Statistics Query and Reporting System (WISQARS). Atlanta, Centers for Disease Control and Prevention, 2018. [www.cdc.gov/injury/wisqars/index.html](http://www.cdc.gov/injury/wisqars/index.html). Accessed Sept 4, 2018
- Britton PC, Bohnert KM, Ilgen MA, et al: Suicide mortality among male veterans discharged from Veterans Health Administration

- acute psychiatric units from 2005 to 2010. *Soc Psychiatry Psychiatr Epidemiol* 2017; 52:1081–1087
- Qin P, Nordentoft M: Suicide risk in relation to psychiatric hospitalization: evidence based on longitudinal registers. *Arch Gen Psychiatry* 2005; 62:427–432
- Brent DA, Greenhill LL, Compton S, et al: The Treatment of Adolescent Suicide Attempters study (TASA): predictors of suicidal events in an open treatment trial. *J Am Acad Child Adolesc Psychiatry* 2009; 48:987–996
- Chung DT, Ryan CJ, Hadzi-Pavlovic D, et al: Suicide rates after discharge from psychiatric facilities: a systematic review and meta-analysis. *JAMA Psychiatry* 2017; 74:694–702
- Leung C-M, Lee S, Lee DTS, et al: Suicide after hospital contact for psychiatric assessment in Hong Kong: a long-term cohort study. *Psychiatry Res* 2018; 264:266–269
- Bostwick JM, Pabbati C, Geske JR, et al: Suicide attempt as a risk factor for completed suicide: even more lethal than we knew. *Am J Psychiatry* 2016; 173:1094–1100
- Richardson JS, Mark TL, McKeon R: The return on investment of postdischarge follow-up calls for suicidal ideation or deliberate self-harm. *Psychiatr Serv* 2014; 65:1012–1019
- Vaiva G, Vaiva G, Ducrocq F, et al: Effect of telephone contact on further suicide attempts in patients discharged from an emergency department: randomised controlled study. *BMJ* 2006; 332:1241–1245
- Bertolote JM, Fleischmann A, De Leo D, et al: Repetition of suicide attempts: data from emergency care settings in five culturally different low- and middle-income countries participating in the WHO SUPRE-MISS study. *Crisis* 2010; 31:194–201
- Fleischmann A, Bertolote JM, Wasserman D, et al: Effectiveness of brief intervention and contact for suicide attempters: a randomized controlled trial in five countries. *Bull World Health Organ* 2008; 86:703–709
- Exbrayat S, Coudrot C, Gourdon X, et al: Effect of telephone follow-up on repeated suicide attempt in patients discharged from an emergency psychiatry department: a controlled study. *BMC Psychiatry* 2017; 17:96
- Cebrià AI, Parra I, Pàmias M, et al: Effectiveness of a telephone management programme for patients discharged from an emergency department after a suicide attempt: controlled study in a Spanish population. *J Affect Disord* 2013; 147:269–276
- Miller IW, Camargo CA Jr, Arias SA, et al: Suicide prevention in an emergency department population: the ED-SAFE study. *JAMA Psychiatry* 2017; 74:563–570
- Stanley B, Brown GK, Brenner LA, et al: Comparison of the safety planning intervention with follow-up vs usual care of suicidal patients treated in the emergency department. *JAMA Psychiatry* 2018; 75:894–900
- Robinson J, Yuen HP, Gook S, et al: Can receipt of a regular postcard reduce suicide-related behaviour in young help seekers? A randomized controlled trial. *Early Interv Psychiatry* 2012; 6:145–152
- Cotgrove A, Zirinsky L, Black D, et al: Secondary prevention of attempted suicide in adolescence. *J Adolesc* 1995; 18:569–577
- Berrouiguet S, Larsen ME, Mesmeur C, et al: Toward mHealth brief contact interventions in suicide prevention: case series from the Suicide Intervention Assisted by Messages (SIAM) randomized controlled trial. *JMIR Mhealth Uhealth* 2018; 6:e8
- Ligier F, Kabuth B, Guillemin F: MEDIACONNEX: a multicenter randomised trial based on short message service to reduce suicide attempt recurrence in adolescents. *BMC Psychiatry* 2016; 16:251
- Ougrin D, Tranah T, Stahl D, et al: Therapeutic interventions for suicide attempts and self-harm in adolescents: systematic review and meta-analysis. *J Am Acad Child Adolesc Psychiatry* 2015; 54:97–107.e2
- McCauley E, Berk MS, Asarnow JR, et al: Efficacy of dialectical behavior therapy for adolescents at high risk for suicide: a randomized clinical trial. *JAMA Psychiatry* 2018; 75:777–785

22. Normand D, Colin S, Gaboulaud V, et al: How to stay in touch with adolescents and young adults after a suicide attempt? Implementation of a 4-phones-calls procedure over 1 year after discharge from hospital, in a Parisian suburb. *Encephale* 2018; 44:301–307
23. Patient Safety Plan Template. New York, National Suicide Prevention Lifeline, 2017. [suicidepreventionlifeline.org/wp-content/uploads/2016/08/Brown-StanleySafetyPlanTemplate.pdf](https://www.suicidepreventionlifeline.org/wp-content/uploads/2016/08/Brown-StanleySafetyPlanTemplate.pdf). Accessed Mar 1, 2019
24. Posner K, Oquendo MA, Gould M, et al: Columbia Classification Algorithm of Suicide Assessment (C-CASA): classification of suicidal events in the FDA's pediatric suicidal risk analysis of antidepressants. *Am J Psychiatry* 2007; 164:1035–1043
25. SPSS Statistics for Windows (version 25.0). Armonk, NY, IBM Corp, 2017
26. R: A Language and Environment for Statistical Computing (version 3.5.1). Vienna, R Foundation, R Core Team, 2018
27. Zalsman G, Hawton K, Wasserman D, et al: Suicide prevention strategies revisited: 10-year systematic review. *Lancet Psychiatry* 2016; 3:646–659
28. Hawton K, Townsend E, Deeks J, et al: Effects of legislation restricting pack sizes of paracetamol and salicylate on self poisoning in the United Kingdom: before and after study. *BMJ* 2001; 322:1203–1207
29. Horwitz AG, Czyz EK, King CA: Predicting future suicide attempts among adolescent and emerging adult psychiatric emergency patients. *Journal of Clinical Child & Adolescent Psychology* 2015; 53: 751–761
30. Nock MK, Green JG, Hwang I, et al: Prevalence, correlates, and treatment of lifetime suicidal behavior among adolescents: results from the National Comorbidity Survey Replication Adolescent Supplement. *JAMA Psychiatry* 2013; 70:300–310
31. Cha CB, Franz PJM, M Guzmán E, et al: Annual research review: suicide among youth—epidemiology, (potential) etiology, and treatment. *J Child Psychol Psychiatry* 2018; 59:460–482
32. Wichstrøm L: Predictors of adolescent suicide attempts: a nationally representative longitudinal study of Norwegian adolescents. *J Am Acad Child Adolesc Psychiatry* 2000; 39:603–610

## Submissions Invited for Column on Integrated Care

The integration of primary care and behavioral health care is a growing research and policy focus. Many people with mental and substance use disorders die decades earlier than other Americans, mostly from preventable chronic medical illnesses. In addition, primary care settings are now the gateway to treatment for behavioral disorders, and primary care providers need to provide screening, treatment, and referral for patients with general medical and behavioral health needs.

To stimulate research and discussion in this critical area, *Psychiatric Services* has launched a column on integrated care. The column focuses on services delivery and policy issues encountered on the general medical–psychiatric interface. Submissions are welcomed on topics related to the identification and treatment of (a) common mental disorders in primary care settings in the public and private sectors and (b) general medical problems in public mental health settings. Reviews of policy issues related to the care of comorbid general medical and psychiatric conditions are also welcomed, as are descriptions of current integration efforts at the local, state, or federal level. Submissions that address care integration in settings outside the United States are also encouraged.

Benjamin G. Druss, M.D., M.P.H., and Gail Daumit, M.D., M.H.S., are the editors of the Integrated Care column. Prospective authors should contact Dr. Druss to discuss possible submissions ([bdruss@emory.edu](mailto:bdruss@emory.edu); [gdaumit@jhmi.edu](mailto:gdaumit@jhmi.edu)). Column submissions, including a 100-word abstract and references, should be no more than 2,400 words.