

## Research Article

# COLLABORATIVE ASSESSMENT AND MANAGEMENT OF SUICIDALITY (CAMS): FEASIBILITY TRIAL FOR NEXT-DAY APPOINTMENT SERVICES

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**Background:** *Despite the ubiquity of suicidality in behavioral health settings, empirically supported interventions for suicidality are surprisingly rare. Given the importance of resolving suicidality and therapists' anxieties about treating suicidal patients, there is a clear need for innovative services and clinical approaches. The purpose of the current study was an attempt to address some of these needs by examining the feasibility and use of a new intervention called the "Collaborative Assessment and Management of Suicidality" (CAMS) within a "Next-Day Appointment" (NDA) outpatient treatment setting. Methods:* *As part of a larger feasibility study, n = 32 suicidal patients were randomly assigned to CAMS care versus Enhanced Care as Usual (E-CAU) in an outpatient crisis intervention setting attached to a safety net hospital. Intent to treat suicidal patients were seen and assessed before, during, and after treatment (with follow-up assessments conducted at 2, 4, 6, and 12 months). Results:* *The feasibility of using CAMS in the NDA setting was clear; both groups appeared to initially benefit from their respective treatments in terms of decreased suicidal ideation and overall symptom distress. Although patients rated both treatments favorably, the CAMS group had significantly higher satisfaction and better treatment retention than E-CAU. At 12 months post-treatment, CAMS patients showed significantly better and sustained reductions in suicidal ideation, overall symptom distress, and increased hope in comparison to E-CAU patients. Conclusions:* *CAMS was both feasible in this NDA setting and effective in treating suicidal ideation, distress, and hopelessness (particularly at 12 months followup).* *Depression and Anxiety 0:1–10, 2011. © 2011 Wiley-Liss, Inc.*

**Key words:** *suicide; attempted suicide; psychotherapy; risk assessment; crisis intervention; feasibility studies; clinical trial*

## INTRODUCTION

More than 33,000 suicides occurred in the United States in 2006—91 suicides per day or one suicide every 16 min.<sup>[1,2]</sup> Death by suicide is part of a much larger problem; millions of Americans have suicidal thoughts and hundreds of thousands make suicide attempts each year.<sup>[3]</sup> In 2008, 2.3 million people made

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a suicidal plan, 1.1 million made an attempt, and 506,000 were hospitalized following a suicide attempt.<sup>[4]</sup> The lifetime cost of self-inflicted injuries in the United States in 2000 was estimated at \$33 billion, including \$1 billion for medical treatment and \$32 billion in lost productivity.<sup>[5]</sup>

Patients who are hospitalized following an attempt often encounter short-term inpatient hospitalization focused heavily on treatment for mental disorders. Some individuals have ongoing outpatient care, but many do not. It can be very difficult to find outpatient referral options for suicidal inpatients. To address this, patients without outpatient treatment are sometimes given a “next-day appointment” (NDA) for follow-up post-hospitalization. Clinicians providing NDA services must have the clinical tools to engage the patient, manage suicidal risk, assist individuals to understand what leads to their suicidality, and ultimately help them re-engage with life. Yet studies indicate that many providers are inadequately trained to provide proper assessment and management of suicidal patients.<sup>[6–10]</sup>

Although the current literature reflects a dearth of suicide-specific treatment studies,<sup>[11–13]</sup> recent trials show substantially reduced risk of suicide attempt following cognitive therapy (CT) and dialectical behavior therapy (DBT), respectively.<sup>[14,15]</sup> However, both require substantial training that is particularly problematic in crisis intervention clinics where there is significant clinician turnover, reducing the likelihood that these interventions will be available for NDA settings.

Preliminary evidence suggests a novel clinical intervention called the Collaborative Assessment and Management of Suicidality (CAMS)<sup>[16]</sup> may match the specific demands of NDA settings. Jobes et al.<sup>[17]</sup> conducted a nonrandomized quasi-experimental clinical trial of CAMS with suicidal US Air Force personnel. Patients working with CAMS clinicians in an outpatient setting markedly reduced their suicidal ideation in significantly fewer sessions than patients with Enhanced Care as Usual (E-CAU) clinicians. Moreover, in the 6 months after initial mental health treatment, CAMS patients had significantly fewer emergency department (ED) visits and primary care medical appointments and spent fewer total minutes in these settings than E-CAU patients. Three additional pilot studies utilizing within-subjects design methodology have shown rapid reductions of suicidal ideation on repeated measures with suicidal patients.<sup>[18–20]</sup>

These initial studies are promising, but none included a randomized design, a significant limitation in the evaluation. In the present study, we have conducted treatment development work and a small randomized feasibility trial of CAMS versus E-CAU in an NDA community setting. Our overall goal was Stage 2B research as termed by Rounsaville et al.<sup>[21]</sup> using a hybrid of efficacy and effectiveness designs that maximize external as well as internal validity comparable to larger trials at the Center for Healthcare Improvement for Addictions, Mental Illness, and

Medically Vulnerable Populations (CHAMMP) at Harborview Medical Center.<sup>[22–30]</sup> Thus, the aims of our study were to demonstrate: (a) patient acceptance of CAMS as provided in the type of clinic where it is needed, (b) the ability to recruit sufficient numbers of an externally valid target population, (c) the feasibility of the treatments as provided in standard clinic with standard therapists, (d) clinically significant improvement over the course of treatment and followup on at least one outcome domain, and (e) whether the experimental treatment was likely to meet the threshold of clinical significance (i.e. the effect size that might “disturb” equipoise in the specific clinical context<sup>[31]</sup>) in a larger trial.<sup>[21]</sup> We predicted that CAMS would be as feasible as E-CAU with better treatment retention and patients’ satisfaction. Although this was a small pilot study with the primary goal of feasibility, we expected that CAMS would result in significant reductions in suicidal ideation and psychological distress and increases in reasons for living and hope during treatment and at followup compared to E-CAU.

## METHOD

### SETTING

Harborview Medical Center is a county-owned hospital focused on underserved and unfunded populations. Harborview’s Mental Health Services (HMHS) provide long-term community mental health services as well as a Crisis Intervention Service, Psychotherapy Service, Geropsychiatry Service, and Peer Support. Study treatment conditions were provided in the Crisis Intervention Service to which all Harborview NDAs are referred.

### PARTICIPANTS

At the outset of the study, potential participants were recruited from the psychiatric emergency and consultation liaison psychiatry services and later expanded to include inpatient psychiatry. Participants were 18 years or older and were evaluated by their treatment provider for a recent suicide attempt or imminent risk. If the clinical team determined that

- (a) patient did not have appropriate outpatient mental health treatment available for an appointment in the next 2 weeks
- (b) a NDA and weekly outpatient followup was an appropriate disposition plan, and
- (c) the patient was sufficiently stable to be discharged home for a minimum of 24 hours prior to NDA appointment, a clinician contacted the study team.

Other inclusion criteria evaluated by the study screener were consent to participate in all study procedures, significant suicidal ideation according to Scale for Suicidal Ideation-Current (score  $\geq 13$ ), and contact information for at least two long-term friends, family, or service providers to help locate the participant for follow-up assessments. To maximize external validity, this study sought to exclude only those for whom participation in a voluntary research study was not possible or for whom study treatment was not relevant. Specifically, exclusion criteria were

- (a) significant psychosis, cognitive or other impairment, or language barrier such that the participant could not understand study procedures or could not provide informed consent in

English, and thus psychosocial therapeutic care in English is contra-indicated and

- (b) a court order to treatment (e.g. subsequent to drug crime, domestic violence, child abuse, driving while intoxicated) such that their participation in study procedures could not be considered voluntary and they would not be free to drop out without negative consequences.

For ethical reasons, treating clinicians provided the initial description of the study to appropriate patients, and when the patient agreed, the potential participant was screened by study staff at the earliest possible time. The screener discussed the study and conducted informed consent with interested patients. For those participants who consented and were eligible, the screener immediately conducted the pretreatment assessment, ran a minimization random assignment program to determine treatment condition, completed an appointment card with the appropriate contact information for the participant's NDA appointment and paid the participant \$20 for completing the pretreatment assessment.

### TREATMENT CONDITIONS

The Collaborative Assessment and Management of Suicidality (CAMS) is an intervention developed by the second author that modifies how clinicians engage, assess, and treat suicidality.<sup>[16,32]</sup> CAMS creates the opportunity for a suicidal patient to identify the “drivers” or causes that lead to suicidal ideation and the subsequent reduction in suicidal ideation and behavior as coping strategy. The Suicide Status Form (SSF) guides assessment, treatment planning, on-going tracking of risk, and outcome/disposition of care. The SSF fosters collaboration as clinician and patient sit side-by-side and deconstruct the patient's suicidality through quantitative and qualitative assessments and consideration of empirically based risk factors (e.g. suicidal planning, access to means, attempt history). Each subsequent CAMS session begins with core assessment items of the SSF that focus the patient and therapist on suicide-related factors and current risk and ends with a treatment plan that always includes a crisis response plan. CAMS sessions were provided weekly for 50–60 min but there are no prescribed session-by-session format or treatment strategies as long as the sessions are both collaborative and suicide-focused. The therapist employs his/her own approach to address the problems driving the suicidality. The length of CAMS is determined by the time that it takes for suicidality to resolve (operationally defined as three consecutive sessions of essentially no suicidality). Thus, CAMS lasts a minimum of four sessions and, based on the previous studies, resolution of suicidality usually occurs within 12 sessions.

Six CAMS clinicians (three case managers, two psychologists, and one psychiatry resident) were recruited and participated in a 1-day didactic training by Dr. Jobes, the CAMS developer. During the study, weekly group consultation was conducted via phone. All CAMS sessions were videotaped and sent to the research team at Catholic University to determine adherence to CAMS during the study. CAMS clinician adherence was defined as four out of the six consecutive sessions receiving an overall rating of “satisfactory.” Two CAMS clinicians did not reach acceptable levels of adherence before dropping out during the training period (both case managers). The remaining four clinicians achieved full CAMS adherence after an average of 4.75 sessions with their first patient—that is within 2 months of training (three therapists and one case manager with some therapy training; average years since degree  $M = 5.8$   $SD = 6.2$ ). Once full adherence was achieved, CAMS clinicians remained adherent during 90% of subsequent rated sessions. (It is worth noting that three out of the four CAMS clinicians were adherent to CAMS treatment during 100% of all sessions rated.)

### ENHANCED CARE AS USUAL

The goal of this study was to determine whether the implementation of CAMS is an improvement over standard outpatient crisis intervention with a strong focus on external as well as internal validity. Accordingly, we sought to insure the comparison condition reflected standard policies and procedures for brief, crisis oriented, mental health care. Standard care for a NDA patient at Harborview entails an intake with the psychiatrist or psychiatric nurse practitioner followed by 1–11 visits with a case manager (average years since degree  $M = 27.5$ ,  $SD = 3.5$ ; mean 4.5 visits based on clinic data) and as needed medication management. Treatment ends in 1–3 months when the “crisis is resolved” with referral for primary care followup or, when there is an appropriate diagnosis and funding is available, additional mental health or substance abuse treatment. At the same time, to minimize variability that would reduce internal validity, care as usual in this study was enhanced in two ways: equivalent clinician time was funded by the study and clinicians in both conditions were asked to schedule a minimum of four sessions (i.e. the minimum number of sessions in CAMS).

There were several treatment protocols common to CAMS and E-CAU. Both conditions were implemented in the HMHS offices following standard HMHS procedures including standard case management, referral options, psychiatric evaluation, and medication management, and referral to emergency or inpatient services if needed.

### MEASURES

The Client Satisfaction Questionnaire (CSQ), an 8-item questionnaire, was administered post-treatment to assess patients' satisfaction with treatment. This measure has been used frequently for evaluating standard community mental health care<sup>[33–35]</sup> and was supplemented by an open-ended question asking what was most and least helpful about the study treatment.

The Scale for Suicide Ideation-Current (SSI)<sup>[36]</sup> is a 19-item interviewer-administered scale that measures suicidal ideation at the worst point of the past 2 weeks. It is a valid and reliable measure of suicidal ideation for use with psychiatric patients<sup>[36,37]</sup> and has shown predictive validity in an outpatient clinic sample for completed suicide in the subsequent 10 years.

The Outcome Questionnaire-45 (OQ-45),<sup>[38]</sup> a 45-item questionnaire, measures key areas of psychological distress (symptoms, interpersonal problems, and social role functioning). It is a widely accepted tool for identifying, tracking, and measuring behavioral health treatment outcomes<sup>[39]</sup> and was our measure of psychological distress. It possesses good psychometric properties with adult psychiatric patients<sup>[38,40,41]</sup> and the internal consistency in this sample was good ( $\alpha = .83$ ).

The Reasons for Living Scale (RFL)<sup>[42–44]</sup> is a self-report 48-item questionnaire with good psychometric properties that was used to assess protective factors or beliefs buffering against suicidal behavior. The RFL has several subscales, but only the total score was used in the present study ( $\alpha = .94$ ).

The Optimism and Hope Scale (OHS)<sup>[45,46]</sup> is a 14-item self-report measure combining a measure of dispositional optimism (Life Orientation Test—Revised) and trait hopefulness (the Hope scale), both of which show high reliability and construct validity.<sup>[45–47]</sup> Internal consistency for the combined scale in this study was very good ( $\alpha = .89$ ).

The Suicide Attempt and Self-Injury Count SASI-C<sup>[48]</sup> is a very brief survey of past self-inflicted injuries, categorized into suicide attempts and nonsuicidal acts. The SASI-C creates counts of self-inflicted injuries by method, medical risk severity, and lethality. Participants received the lifetime assessment at pretreatment and the follow-up version at all assessments.

The Treatment History Interview—Short Form (THI)<sup>[49]</sup> uses a time-line follow-back method of assessment to capture treatment history including the number of ED visits, psychiatric and medical hospital days, and physician and clinic visits. For participants who reported hospitalization in the past year, previous studies revealed 90% agreement between participant report and hospital records for number of admissions per participant,  $r = .99$ , and 80% agreement for number of days per participant,  $r = .99$ . There were no false positives for participation in individual psychotherapy (verified by calling psychotherapists). Analyses of false negatives were not possible.

Therapist adherence to CAMS was assessed with the CAMS Rating Scale (CRS) an 18-item observer rating scale that was completed by two of the authors (D.A.J. and S.S.O.) and a graduate student trained by them based on videotapes of CAMS sessions.

## PROCEDURES

All follow-up assessments were conducted in person or over the phone (based on the participant's preference) with a study assessor blinded to treatment condition. Instruments were not modified for phone follow-up assessments. Of the 77 follow-up assessments (including partial interviews), 52% were conducted over the phone ( $n = 40$ ); 48% were conducted in person ( $n = 37$ ). All assessors were trained by the first author in all assessment protocols, including risk assessment.<sup>[50,51]</sup> Given the small sample size, random assignment to treatment condition was conducted via a minimization algorithm matching for gender, history of suicide attempt, pre-existing use of psychotropic medications, and history of substance abuse.<sup>[52]</sup>

Follow-up assessments were conducted at 2, 4, 6, and 12 months after the pretreatment assessment. Reimbursement was \$10 for each of the 2- and 4-month assessments and \$15 for the 6- and 12-month assessments; for each assessment, participants could also receive an additional \$5 for contacting the study to schedule the assessment and another \$5 for showing the first time the assessment was scheduled. A minority of participants in both conditions received additional assessments at 1, 3, and 5 months; however, for the purposes of this article, analyses focus on the above time points most participants completed. Primary outcome variables (suicidal ideation and behavior, OQ-45, RFLS, OHS, and emergency services) were assessed by a licensed clinician blind to treatment condition. The treatment information (outpatient services, client satisfaction, etc.), which would break the blind were assessed by the Research Coordinator. The University of Washington Institutional Review Board and a Data Safety Monitoring Board (DSMB) for the study approved all study protocols, consents, and procedures.

## DATA ANALYSES

Several features of the data needed to be taken into account in the analyses. Data were imbalanced owing to missing data, and the change across time for several outcomes was highly nonlinear, with a rapid drop from baseline to early assessments, more gradual change through 6 months, and notable differences at the 12-month follow-up assessment. These data characteristics could be handled by (generalized) linear mixed models (GLMM<sup>[53]</sup>). GLMM model heterogeneity across participants using random effects terms and can incorporate imbalanced data (though, with assumptions about missing data). However, most software to fit GLMM uses a maximum likelihood framework for estimation, which can be biased in small samples. Because of the small sample size with the present data, Bayesian GLMM using Markov chain Monte Carlo (MCMC) estimation was used, which has been shown to be unbiased even in small samples (Raudenbush and Bryk,<sup>[54]</sup> Chapter 13).

As the change across time was notably nonlinear and different between treatment groups, the following GLMM was used for the primary outcomes:

$$\begin{aligned} \text{Outcome}_{it} = & b_0 + b_1(\text{E-CAU}) + b_2(2 \text{ mos}) + b_3(4 \text{ mos}) + b_4(6 \text{ mos}) \\ & + b_5(12 \text{ mos}) + b_6(\text{E-CAU} \times 2 \text{ mos}) \\ & + b_7(\text{E-CAU} \times 4 \text{ mos}) + b_8(\text{E-CAU} \times 6 \text{ mos}) \\ & + b_9(\text{E-CAU} \times 12 \text{ mos}) + u_{0i} + e_{it} \end{aligned}$$

where  $t$  indexes time and  $i$  indexes individuals. Assessment point was modeled using a series of indicator variables, such that each assessment predictor compares the mean at that assessment to baseline. In addition, E-CAU (CAMS, 0; E-CAU, 1) is an indicator variable for treatment. CAMS was chosen as the reference group so that the within-group change for CAMS is captured by the main-effect coefficients for assessment period. The two error terms ( $u_{0i}$ ,  $e_{it}$ ) capture the variability of individual participants and residual error, respectively.

Bayesian models require prior distributions for each of the parameters in the model, and noninformative priors were used for all parameters (i.e. inverse-Wishart priors for random effects and multivariate Normal prior for fixed effects). MCMC is a simulation-based estimation procedure, and 100,000 MCMC iterations were run following a burn-in of 50,000, with every 50th iteration saved for analysis. Traceplots and the Gelman-Rubin statistic was used to ascertain that models had converged (see Gelman and Hill<sup>[55]</sup> or Lynch<sup>[56]</sup> for introductions to Bayesian methods). Analyses adhered to the intent to treat principle, and participants were analyzed according to their randomization. All analyses were done in R v2.12.1<sup>[57]</sup> and made extensive use of the MCMCglmm package for Bayesian GLMM.<sup>[58]</sup>

## RESULTS

### FEASIBILITY OUTCOMES

Figure 1 shows the CONSORT flow diagram. Out of 44 patients approached about the study, 32 were randomized to either CAMS ( $n = 16$ ) or E-CAU ( $n = 16$ ). Two CAMS patients turned out to be severe and complex requiring intensive intervention and were removed from the protocol based on consultation with the IRB and DSMB, and one E-CAU participant was court-ordered to treatment and therefore removed from the protocol. The final sample was thus 14 CAMS and 15 E-CAU. In total, 12 out of 14 CAMS patients (78.5%) completed study assessments versus 10 out of 15 E-CAU patients (60%). (One in CAMS and three in E-CAU dropped out of study assessments. The remainder no longer had valid contact information and/or failed to respond to over 40 contact attempts each at different times of day on different days of the week.)

Demographic characteristics of the sample are summarized in Table 1. The sample was 62% women, 66% Caucasian, and 69% single. A third were not working at all and half the sample earned less than \$15,000/year. A total of 16% were street homeless and 19% only had a temporary place to live. There were no significant differences on background characteristics nor primary outcomes by treatment condition as shown in Table 2 or Figure 2. (Note that the treatment groups are not significantly different on suicide

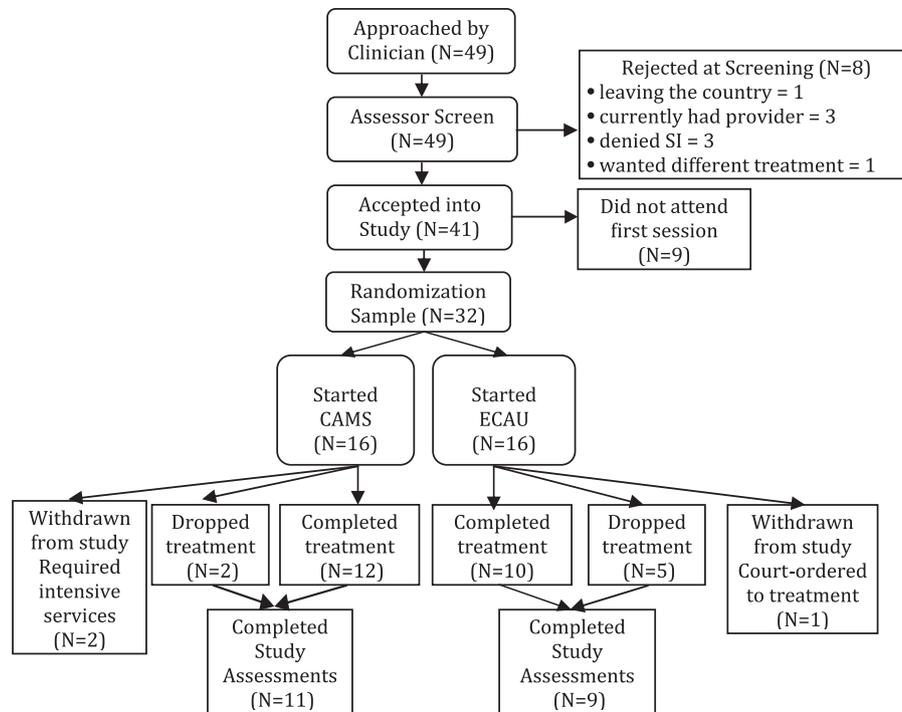


Figure 1. Consort diagram.

attempts/nonsuicidal self-injuries at the start of treatment as summarized in Table 2; Fisher’s exact test, OR = 3.5, 95% CI for OR = 0.64, 21.69).

Twelve of the final 14 CAMS patients completed treatment (86%) as did 10 of the final E-CAU participants (67%). Participants were seen in CAMS for an average of 8.4 (*SD* = 4.4) sessions over 13.5 weeks and in E-CAU for an average of 4.7 (*SD* = 3.1) sessions over an average of 9.5 weeks. Average patient satisfaction was high for both treatments but significantly higher for the CAMS condition: E-CAU 3.1 and CAMS 3.7 (on scale of 1, low through and 4, high;  $t(24) = -2.76$   $P = .01$ ). The majority of participants completed the assessments as follows: Month 2 (52% completed, 0% refused, 48% incomplete because could not locate participant or he/she could not complete the interview), 4 (66% completed, 0% refused, 36% incomplete), 6 (69% completed, 7% refused, 24% incomplete), and 12 (69% completed, 14% refused, 17% incomplete).

**OUTCOME DESCRIPTIVES**

Descriptive data for primary outcomes are shown in Figure 2 by treatment condition and assessment point. The descriptive data show that individuals who received CAMS rapidly decreased their suicidal ideation, which remained low throughout treatment and at the 12-month assessment. E-CAU patients also steadily reduced their suicidal ideation, though not quite as rapidly, and there appears to be some rebound post-treatment. A similar general pattern holds for overall

mental health as measured by the OQ-45. CAMS patients rapidly improved and retained gains through the 12-month assessment, whereas E-CAU patients improved, though not as rapidly and with some rebound. RFL and OHS both demonstrated some early improvement for CAMS patients that were largely maintained over 12 months, whereas the E-CAU patients showed relatively less improvement and at 12 months were similar to their baseline levels.

Given the low base rate of self-inflicted injury and health services, no statistical analyses were performed but results are summarized for descriptive purposes in Table 2. There were only three suicide attempts postbaseline—2 in CAMS and one in E-CAU. Including both suicide attempts and nonsuicidal self-injuries in a self-inflicted injury total, CAMS participants made slightly fewer self-inflicted injuries at all points—including baseline. CAMS also had slightly fewer ED admissions overall and ED admissions for behavioral health reasons. Inpatient psychiatric days varied over the time period without clearly favoring one condition.

**BAYESIAN GLMM ANALYSES**

Table 3 lists the coefficients and 95% CI for the Bayesian GLMM presented above for each of the four primary outcomes. Note that SSI was strongly skewed and bounded by zero. This measure reflects a count of 19 characteristics of an individual’s plans and wishes to die by suicide, and thus SSI was modeled as a Poisson GLMM, whereas other outcomes were fit using linear mixed models assuming normally distributed errors.

TABLE 1. Demographics of sample

		N	%	M±SD	Range
Age				36.8±10.1	19–62
Sex	Female	18	62		
Ethnicity	White-Caucasian	19	66		
	Black-African American	4	14		
	Asian or Asian American	1	3		
	Latino/Latina	1	3		
	Mixed or other ethnicity	3	10		
	Participant does not know	1	3		
	Marital status	Single, never married	20	69	
Divorced or separated		7	24		
Widowed		1	3		
Married		1	3		
Sexual orientation	Heterosexual	24	83		
	Bisexual	5	17		
	Homosexual	0	0		
Residential arrangement	Street homeless	5	16		
	Temporary housing	6	19		
	Permanent housing	21	65		
Employment status	Not working or retired	11	38		
	<20 h per week	3	10		
	20–39 h per week	5	17		
	≥40 h per week	10	35		
Education	Some high school	3	10		
	High school degree or GED	10	35		
	Some college	8	28		
	Business or technical training	3	10		
	College degree	5	17		
Annual income	<\$5,000	8	28		
	\$5,000–\$14,999	8	28		
	\$15,000–\$29,999	8	28		
	>\$30,000	4	14		
	Unknown	1	2		

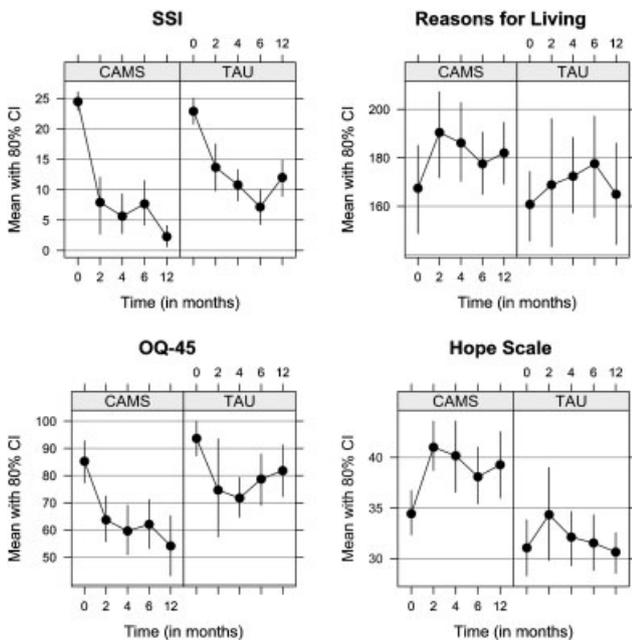


Figure 2. Means and 80% confidence intervals for primary outcomes by treatment condition and assessment point.

The key difference for interpretation is that the Poisson GLMM uses a log link function, and similar to a logistic regression model, raw coefficients are typically exponentiated (i.e. raised to base  $e$ ) and interpreted as rate ratios (RR). Confidence intervals for RRs excluding 1 are significant at the  $P < .05$  level. The main effect of treatment in all models tests the difference between treatments at baseline, which is nonsignificant for all primary outcomes.

The results show that CAMS patients were significantly improved from their baseline levels of SSI, ranging from a 61% reduction at 2 months ( $RR = 0.39$ ) to an 89% reduction at 12 months ( $RR = 0.11$ ) (as noted above, E-CAU is coded 1 and hence the main effects of assessment represent the within group change of CAMS patients). The E-CAU by assessment interactions at 2 and 4 months show that E-CAU patients were reporting more suicidality than CAMS patients, though not significantly so. At the 6-month assessment, the two groups were virtually identical in reported SSI, whereas at 12 months E-CAU patients were notably (and significantly) worse than CAMS patients ( $RR = 4.81$ ), reflecting what was seen in the descriptive data.

**TABLE 2. Descriptive statistics of infrequent outcomes by treatment condition and assessment**

Outcome variable	Assessment time point	CAMS		E-CAU	
		Mean	SD	Mean	SD
Suicide attempts/self-inflicted injuries	0 month	3.0	9.3	7.7	24.5
	2 month	N/A	N/A	5.5	7.8
	4 month	0.0	0.0	0.8	1.8
	6 month	0.2	0.4	0.0	0.0
	12 month	1.2	3.9	3.3	7.6
ED admissions (all)	0 month	1.5	1.2	1.6	0.8
	2 month	N/A	N/A	0.5	0.7
	4 month	0.4	0.5	0.4	0.7
	6 month	0.4	0.5	0.2	0.4
	12 month	0.4	0.8	1.0	2.4
Behavioral health ED admissions only	0 month	1.3	1.1	1.1	0.6
	2 month	N/A	N/A	0.5	0.7
	4 month	0.1	0.4	0.4	0.7
	6 month	0.2	0.4	0.2	0.4
	12 month	0.2	0.4	0.6	1.6
Number of inpatient days	0 month	5.5	5.4	7.0	7.0
	2 month	N/A	N/A	4.0	5.7
	4 month	1.4	2.5	1.0	2.3
	6 month	3.5	7.0	1.3	4.6
	12 month	1.4	4.5	3.2	8.0

N/A, not applicable (as no data observed for specific treatment at given time point).

**TABLE 3. Regression results (coefficients and 95% confidence intervals) for primary outcomes**

	SSI			OQ-45			RFL			OHS		
	RR	Lower	Upper	B	Lower	Upper	B	Lower	Upper	B	Lower	Upper
Intercept	24.40	22.14	26.89	85.61	74.67	100.94	169.52	144.82	195.97	33.84	29.53	37.52
E-CAU	0.94	0.79	1.11	4.08	-10.36	25.59	-7.16	-39.14	29.47	-2.55	-8.01	2.75
2 mos	0.39*	0.20	0.77	-9.69	-30.67	3.00	8.54	-15.38	31.86	3.54	-0.17	7.13
4 mos	0.27*	0.13	0.54	-20.63*	-32.44	-7.65	12.11	-6.53	30.96	4.96*	1.97	7.81
6 mos	0.32*	0.15	0.66	-20.93*	-34.72	-11.44	5.71	-11.56	25.21	4.15*	1.12	6.83
12 mos	0.11*	0.04	0.30	-32.27*	-45.50	-20.49	8.04	-9.17	28.62	5.60*	2.61	8.44
E-CAU × 2 mos	1.64	0.72	3.71	0.77	-23.46	24.29	-16.13	-47.30	16.66	-0.11	-4.91	5.20
E-CAU × 4 mos	1.84	0.82	4.14	2.41	-14.65	18.60	-5.65	-28.35	21.40	-2.83	-6.72	1.25
E-CAU × 6 mos	0.96	0.36	2.60	6.92	-8.55	25.39	5.65	-20.92	30.73	-1.63	-5.69	2.33
E-CAU × 12 mos	4.81*	1.61	14.33	19.65*	4.13	36.65	-2.78	-30.89	21.75	-4.07*	-8.77	-0.12

E-CAU is an indicator variable (CAMS, 0; E-CAU, 1), assessment covariates are indicator variables comparing reported assessment to baseline (e.g. 2 mos: 0, baseline assessment; 1–2 month assessment). SSI was modeled as a Poisson-generalized linear mixed model. RR, rate ratio, B, unstandardized regression coefficient, lower and upper report bounds of 95% confidence interval. \*Statistically significant difference.

The results for the OQ-45 are quite similar to those for SSI: CAMS patients rapidly improved, with significant reductions vs. baseline at 4-, 6-, and 12-month assessments. The E-CAU by assessment interactions were all positive (suggesting worse mental health for E-CAU) and were significantly different at 12 months. The RFL scale was notable in that the intraclass correlation coefficient (ICC) was extremely high (.80). This reflects that scores within an individual were very highly correlated; perhaps suggesting that RFL is more trait-like as opposed to something that is readily manipulable by psychological intervention. Although the assessment coefficients were all positive for CAMS, none of them were significantly above

baseline levels. Similarly, none of the E-CAU by assessment contrasts was significant. The OHS scale shows that the CAMS patients had significantly greater hope beginning at the 4-month assessment and that E-CAU patients were significantly below their CAMS counterparts at 12 months.

## DISCUSSION

The current feasibility trial using a hybrid efficacy and effectiveness design found that patients psychiatrically hospitalized for a suicide attempt or imminent risk were interested in and willing to participate in outpatient NDA treatment and CAMS. The treatments

were found to be acceptable to participants, albeit with a statistically higher satisfaction for CAMS vs. E-CAU. We found that for clinicians with psychotherapy training, we could train CAMS to adherence quickly and that CAMS therapists maintained adherence. Case management training alone was insufficient training for CAMS adherence.

We noted two other feasibility issues that suggest modifications for future trials. First, the majority of suicidal individuals in this study had both high symptoms and high service needs that frequently required long-term follow-up case management, pharmacotherapy, or other treatment. It appeared that the NDA structure of stabilization with study treatments then referral was a difficult transition for these patients. A second related issue was the need for case management for housing, finances, vocational, and medical problems. These patients varied widely in their need for these services, but often needs were beyond the capacity of the CAMS session or took up all the time of the E-CAU clinician. In response to both of these issues, a model that can pair NDA patients with the level of case management services they need and begins long-term care (when needed) simultaneous with NDA treatment would likely lead to a more effective transition clinically—although clinics would have to overcome structural hurdles in terms of access criteria and funding for such programs.

Results showed that CAMS participants had improved more than E-CAU at the 12-month assessment on suicidal ideation, mental health symptoms, and hope; with CAMS participants continuing improvement to near zero where E-CAU participants appeared to lose ground back into the clinical range. Patients in the study clearly took to the CAMS approach; they were both satisfied and showed good retention to the treatment. The overt CAMS focus on reducing suicidal ideation and behavior as a means of coping with pain and distress and strengthening of alternative coping skills clearly seemed to work for many of these patients. In addition, the CAMS patients were responsive to the idea of identifying, targeting, and treating the drivers of their suicidality with collaboratively developed problem-focused interventions. Statistically significant effects were seen even with modest sample sizes and statistical power (particularly at 12-month followup), speaking to the potentially meaningful and enduring impact of the approach.

There are a number of limitations to this study. The sample was small and recruited almost entirely from inpatient psychiatric services looking for follow-up care for their patients without needed funding. Thus, this population is not representative of all individuals who make suicide attempts or are imminently suicidal and larger trials are clearly needed. However, this was the group of high concern to the inpatient psychiatric units who were worried they would be readmitted to the ED, and they referred many more patients than we could accept and continued to try and refer patients to the

study long after the study had closed. Second, because this study was a feasibility trial, several study procedures changed over the course of the trial. In particular, the change from recruitment in emergency and consultation-liaison psychiatry services which were the initial goal of the study to inpatient psychiatry services and the change in the assessment time points. These changes emphasize the need for replication of these results. There were also problems locating participants for follow-up and facilitating their completion of assessments despite considerable efforts. We could discern no pattern of who did not complete assessments.

Third, patients in the CAMS condition received on average a greater number of treatment sessions, which may have affected the treatment outcomes above and beyond the specific effect of the therapeutic intervention. The study's funding of equivalent clinical time for both conditions and the fact that one E-CAU clinician had longer and more frequent sessions than the other suggests that this difference was clinical choice rather than owing to practical considerations. Although this potential confound reflects our study's bias toward external validity of both control group and subsequent results, replication controlling for attention is required to rule out this limitation. Finally, the CAMS interventionists were composed of three therapists and one case manager with some therapy training, whereas the E-CAU interventionists were both case managers, which may have affected the results. Again, this potential confound reflects our emphasis on external validity and future studies with comparable providers are needed to rule it out. However, given the overwhelming case management needs of many study participants, the more experienced case management skills of E-CAU therapists compared to CAMS therapists may have offered important benefits. As noted above, pairing CAMS with ongoing case management services would most likely maximize the likelihood of significant overall improvement in the patients' lives. The lead authors are currently conducting a larger well-powered randomized clinical trial of CAMS; clearly, other such trials are needed. In addition, other strategies to improve access to outpatient followup after admission for suicidal behavior—either NDA or otherwise—is critical as are improvements to the quality of this care.

## CONCLUSION

After many years of research neglect, this is an exciting time of expanding empirical studies related to the treatment of suicidal risk. Recent innovations in screening, more thorough assessments, the use of safety plans, and evidence-based suicide-specific interventions are increasingly being seen in the professional literature and in clinical practice. Based on the current investigation—even with extremely disadvantaged and challenged suicidal patients—the prospect of making a

meaningful and potentially enduring difference using CAMS seems possible.

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