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Reducing Suicidal Ideation in Home Health Care: Results from the CAREPATH Depression Care Management Trial

Matthew C. Lohman PhD¹, Patrick J. Raue PhD¹, Rebecca L. Greenberg, MS¹, and Martha L. Bruce, PhD¹

¹Department of Psychiatry, Institute of Geriatric Psychiatry, Weill Cornell Medical College, White Plains, New York

Abstract

Objectives—The study evaluated the effectiveness of a depression care management intervention in reducing suicidal ideation (SI) among home health patients.

Methods—Data come from the cluster-randomized effectiveness trial of the Depression Care for Patients at Home (Depression CAREPATH), an intervention that integrates depression care management into the routine nursing visits of Medicare home health patients screening positive for depression. Patients were interviewed at baseline, 3, 6, and 12 months follow-up. Suicidal ideation was measured using the Hamilton Rating Scale for Depression (HAM-D) item. We compared likelihood of any level of SI between intervention and usual care patients using longitudinal logistic mixed-effects models.

Results—A total of 306 eligible patients enrolled in the trial. Among them, 70 patients (22.9%) reported SI at baseline. Among patients with SI, patients under the care of nurses randomized to CAREPATH were less likely to report SI over the study period (OR=0.51, 95% CI: 0.24-1.07), with 63.6% of usual care versus 31.3% of CAREPATH participants continuing to report SI after one year. Baseline major depression, greater perceived burdensomeness, and greater functional disability were associated with greater likelihood of SI.

Conclusion—SI is reported in more than 10% of Medicare home health patients. The Depression CAREPATH intervention was associated with a reduction in patients reporting SI at one year, compared to enhanced usual care. Given relative low burden on nursing staff, depression care management may be an important component of routine home health practices producing long-term reduction in SI among high-risk patients.

Keywords

Suicidal ideation; home health; depression care management

Introduction

Suicidal ideation is common among older adults receiving short term Medicare-funded home health nursing, with approximately 11.7% experiencing either active or passive suicidal ideation within the first month of care (Rowe *et al.*, 2006; Raue *et al.*, 2007). Despite the high-risk, there are few evidence-based approaches to reducing suicidal ideation in home health care (HHC) patients, and it is unclear to what extent depression care might reduce suicidal ideation in HHC. This study examined the effectiveness of a depression care management intervention in reducing suicidal ideation among older adults receiving HHC nursing services.

Suicidal ideation (SI) is a key risk factor for suicide and represents a clinically relevant, non-normative sign of distress arising from physical, psychiatric, and/or social factors (Szanto, 1996; Van Orden *et al.*, 2014). The prevalence of major depression among Medicare HHC patients (13.5%) is nearly twice that of older adults receiving primary care services (Bruce *et al.*, 2002). Even in the absence of depression, passive and active SI may be prevalent in community-dwelling or hospitalized older adult populations (Raue *et al.*, 2010; Van Orden *et al.*, 2013), and predict increased risk of mortality above and beyond that explained by depression, medical burden, and disability (Raue *et al.*, 2010). Although depression treatment may be effective in reducing SI among older adults (Alexopoulos, 2005), treatment response is often slower among high-risk individuals, and SI may be a persistent symptom among those treated successfully (Szanto *et al.*, 2003).

Few (<3%) Medicare HHC patients are referred for psychiatric reasons, but many experience a confluence of risk factors for SI, including poor social support, medical comorbidity, disability, pain, and perceived burdensomeness that increase risk independent of psychiatric disorder (Conwell, Duberstein, Caine, 2002; Rowe, Bruce, Conwell, 2006; Raue *et al.*, 2007; Conwell and Thompson, 2008; Li and Conwell, 2010; Cukrowicz *et al.*, 2011; Park *et al.*, 2014). Evidence suggests, for instance, that greater medical comorbidity and functional disability may exacerbate geriatric depression, hindering treatment progress and slowing symptom remission (Alexopoulos *et al.*, 1999; Szanto *et al.*, 2003; Alexopoulos, 2005). Likewise, perceived burdensomeness, which may result from illness and functional disability (Khazem *et al.*, 2015), increases risk of SI (Cukrowicz *et al.*, 2011; Hill and Pettit, 2014; Guidry and Cukrowicz, 2015); however there are few studies exploring the influence of perceived burdensomeness on longitudinal course of SI (Hill and Pettit, 2014). While medical comorbidity, functional disabilities, and perceived burdensomeness are established risk factors for SI, it is unclear to what extent these factors may influence remission or persistence among depressed HHC patients.

Given home health patients' high risk, HHC episodes represent an important though brief time period to ameliorate depression and SI. The Depression Care for Patients at Home (Depression CAREPATH) intervention capitalizes on the core clinical skills of home health nurses to provide depression care management during routine care visits. The CAREPATH protocol trained nurses to identify and monitor depressive symptoms, to help patients manage depression treatment regimens, and to coordinate treatment with other care providers (Bruce *et al.*, 2011a; Bruce *et al.*, 2011b). We previously demonstrated that, among

HHC patients with clinically significant depressive symptoms, the CAREPATH intervention was associated with significant reduction in depressive symptoms at 3, 6, and 12 months follow-up compared to patients receiving usual care enhanced by training in depression and suicide risk assessment (Bruce *et al.*, 2015). It is unclear whether the reduction in depressive symptoms among CAREPATH patients translates to reduction in SI or if SI persists beyond HHC episodes.

This study had two complementary aims. Our primary aim was to evaluate the effectiveness of the CAREPATH intervention in reducing passive or active SI among patients reporting SI at start of Medicare HHC episodes. Given the demonstrated effectiveness of CAREPATH at reducing depressive symptoms overall, we hypothesized that patients visited by CAREPATH-trained nurses would experience less SI over time than those who received enhanced usual care. Our secondary aim was to identify correlates of greater likelihood of baseline and persistent SI among all HHC patients who screened positive for depression. Based on prior findings we hypothesized that greater medical comorbidity, functional disability, and perceived burdensomeness would be associated with greater likelihood of baseline and persistent SI.

Methods

Study data originate from a cluster-randomized effectiveness trial of the CAREPATH depression care management intervention among older HHC patients. The trial was approved by the institutional review boards (IRB) of Weill Cornell Medical College (WCMC), Montefiore Health Systems, and University of Pennsylvania Health Systems, and written informed consent was obtained from study participants. Secondary analysis for this study was approved by the WCMC IRB.

Sample

Study methods were described previously (Bruce *et al.*, 2015). Briefly, the CAREPATH trial was undertaken in six home health agencies representing geographically distinct US regions (Bruce *et al.*, 2015). At each agency, a minimum of two pre-existing nurse teams were randomized to either intervention or enhanced usual care (EUC), resulting in 12 intervention and 9 EUC nurse teams across all agencies (mean team size was 8.5 (3.4)). Intervention and EUC teams were similar in terms of team size.

Agencies identified eligible Medicare patients using the mandatory Outcome and Assessment Information Set (OASIS) conducted at the start of HHC. Patients were eligible if they were age ≥ 65 years and screened positive on the two-item Patient Health Questionnaire (PHQ-2) depression screen (Kroenke, Spitzer, Williams, 2003). Other eligibility criteria from the OASIS included no dementia, life expectancy ≥ 6 months, no current suicide plan, English or Spanish speaking, and no significant hearing or speech impairment. With their agreement, eligible patients were visited by local research assistants who obtained written informed consent. Study personnel conducted in-person assessments of depression, health, and sociodemographic characteristics at baseline. Follow-up telephone assessments were conducted at baseline and 3, 6, and 12 months.

Participant Sample

Based on routine nursing assessments at start of homecare, 755 patients screened positive for depression and met other initial eligibility criteria. Of these patients, 306 remained eligible and consented to participation at baseline interview. Participant flow for CAREPATH has been described in detail previously (Bruce *et al.*, 2015). Among study participants, 186 received care from nurses randomized to CAREPATH intervention and 121 received care from nurses randomized to enhanced usual care (EUC).

Intervention groups

CAREPATH: The Depression CAREPATH protocol was designed for patients who screened positive for depression on the OASIS. The protocol and its development were described previously (Bruce *et al.*, 2011a; Bruce *et al.*, 2011b). For patients who screened positive, nurses were trained to assess depression severity using the 9-item Patient Health Questionnaire (PHQ-9) and to conduct follow-up suicide risk assessment for patients who reported suicidal ideation. Study personnel worked with agencies to adapt pre-existing suicide risk protocols to agency resources and circumstances (Bruce *et al.*, 2011b). For patients scoring PHQ-9 ≥ 10, nurses followed depression care management guidelines during routine care visits, including: (1) weekly depressive symptom assessment (PHQ-9); (2) care coordination with patients' physicians or specialists; (3) management of adverse effects and adherence to antidepressant medications; (4) patient and family education; (5) assistance with setting short-term functional and behavioral goals. Nurses were expected to monitor symptoms of patients scoring 5-9 on the PHQ-9. Use of CAREPATH was monitored by agency nurse supervisors, who themselves were supervised by study investigators on monthly conference calls.

Enhanced Usual Care: Nurses randomized to enhanced usual care received training in depression screening using the PHQ-9 and follow-up suicide risk assessment for patients who reported suicidal ideation. They were not trained in depression care management protocol, but followed agency-specific standard procedures for depression care.

Outcomes—Suicidal ideation (SI) and depression severity were measured at baseline and follow-up (3, 6 and 12 months) using the 24-item Hamilton Rating Scale for Depression (HAM-D) (Hamilton, 1960), a structured clinical interview administered by telephone at all study time-points (Simon, Revicki, VonKorff, 1993). SI was assessed using the HAM-D's suicidal ideation item. Patients were asked whether they had thoughts 'that life was not worth living,' 'that they would be better off dead,' or wished s/he 'were dead' within the past week. Patients were then asked whether they had specific thoughts about killing themselves, if they had carried out self-harm or suicidal behaviors, or if they had attempted suicide within the past week. Patients were classified as having no SI, passive SI (wishing they were dead), or active SI (thoughts of self-harm or killing oneself). For regression analyses, SI was considered as a binary variable in which patients were considered as having no SI or any SI (passive or active ideation).

Covariates—Diagnosis of major or minor depressive disorder was determined by the Structured Clinical Interview for Axis I DSM-IV Disorders (SCID) (Spitzer, Gibbon,

Williams, 1995). Sociodemographic variables included age (years), race (dummy indicator for minority race), gender, marital status (dummy indicators for married, divorced/separated, widowed, never married), education (years), and family income below poverty level (dummy indicator for below poverty level). Medical comorbidity was determined using the Chronic Disease Scale (Von Korff, Wagner, Saunders, 1992) (range: 0-18), and disability was determined by both limitations in activities of daily living (ADLs) and instrumental activities of daily living (IADLs) (Lawton and Brody, 1969) as continuous variables. Cognitive status was assessed using the Mini-Mental State Examination (Folstein, Folstein, McHugh, 1975). Perceived burdensomeness was assessed using the 5-item Perceived Burdensomeness Questionnaire (PBQ; range: 0-30) (Van Orden *et al.*, 2008). Antidepressant medication prescription at baseline was considered as a binary variable (yes/no). All models were adjusted for nursing team cluster.

Statistical Analysis—Bivariate analyses compared sociodemographic and health-related variables by baseline level of suicidal ideation using Fisher exact tests for categorical variables and ANOVA for continuous variables (with Scheffe's post-hoc analyses for two-group comparisons).

Secondary Aim

Secondary analyses evaluated the influence of patient characteristics on baseline and longitudinal SI among all participants (N=306). To estimate influence of covariates on baseline SI, we fit logistic mixed-effects models with participant-level random intercepts and fixed effects for time, intervention, and all covariate predictors (full model). To evaluate for potential confounding, we next used a backward selection change-in-estimate procedure. Covariates were successively removed from the full-model unless removal produced a 10% or greater change in the estimated association between SI and intervention group. Covariates remaining in the model were included as adjustment variables in subsequent analyses (selected model). To address our a priori hypothesis regarding influence of selected covariates on SI course, perceived burdensomeness (PBQ), comorbidity (CDS), and functional disability (number of IADL difficulties) were evaluated as potential modifiers by including moderator $\times$ time interaction terms.

Primary Aim

To evaluate our primary hypothesis, a logistic mixed-effects model was used to assess longitudinal trends in SI among participants who reported SI at baseline and who would therefore prompt agency-specific suicide risk assessments and protocols (N=70). The modeled outcome was presence of any SI over four waves of analysis: baseline and 3, 6, and 12 months follow-up. This model included person-level random intercepts and fixed effects for intervention, time, and intervention $\times$ time interaction. Models were adjusted for covariates as identified by the covariate selection procedure or by substantive theory, including age, race, baseline major depression, medical comorbidity, perceived burdensomeness, and number of IADL limitations.

All regression models and statistical analyses were performed using STATA (v.11) statistical software (StataCorp, 2009) and maximum likelihood estimation. We used maximum

likelihood estimation methods to incorporate all available patient information regardless of loss to follow-up, limiting potential selection bias. Secondary analyses explored influence of and factors related to attrition.

Results

Participant characteristics at baseline are described in Table 1. The majority of participants (69.6%) were women; 18.0% were African American and 12.8% were Hispanic. Mean age was 76.5 years (range: 65 to 98). Patients had substantial medical burden and functional limitation with 92.7% and 62.3% reporting at least one limitation in IADLs and ADLs respectively. Over half (52%) of participants were prescribed an antidepressant medication.

Of the 306 participants, 61 expressed passive suicidal ideation and 9 expressed active suicidal ideation (SI) at baseline interview. Participants with SI had significantly higher HAM-D and perceived burdensomeness scores than those without SI. Participants with SI were also more likely to be diagnosed with MDD according to DSM-IV criteria (Table 1).

Participants who expressed active or passive suicidal ideation at baseline did not differ significantly from participants with no SI by age, race, gender, education, marital status, or income (Table 1). There were also no significant differences between those with and without SI on medical burden (CDS scores), number of functional limitations, and referral source.

Of 306 participants, 254 patients completed at least one follow-up interview; on average, participants completed three of four interviews. Previous analyses found that non-completion of follow-up assessments was related only to covariates included in the current analyses: Hispanic ethnicity, greater medical burden, and ADL disability (Bruce *et al.*, 2015). Additional multivariate logistic regression showed that non-completion was unrelated to suicidal ideation (OR: 0.99, 95 CI: 0.68-1.47), baseline major depression (OR: 0.95, 0.53-1.68) or intervention group (OR: 0.93, 95% CI: 0.56-1.56).

Secondary Aim

Associations of baseline characteristics with intervention effects and likelihood of suicidal ideation were assessed using logistic mixed-effects models including the total sample (N=306). As shown in Table 2, the likelihood of SI decreased significantly across study time regardless of intervention group (OR: 0.76, 95% CI: 0.61-0.96). At baseline, participants of minority race were significantly less likely to express SI compared to white participants. MDD (OR: 6.55, 95% CI: 2.76-15.53) and higher levels of perceived burdensomeness (OR: 1.12, 95% CI: 1.06-1.18) were associated with significantly greater likelihood of SI over the study period, as were greater number of IADL limitations (OR: 1.39, 95% CI: 1.04-1.85). Contrary to an a priori hypothesis, greater medical burden was not associated with higher odds of suicidal ideation.

While greater perceived burdensomeness and IADL limitations were associated with greater baseline suicidal ideation, these factors did not predict differential course of suicidal ideation over time as shown by their interaction terms with time (Table 3). Likewise, we found no evidence that medical comorbidity predicted differential course of suicidal ideation.

Primary Aim

The primary hypothesis was tested in a restricted sample of participants who expressed suicidal ideation at baseline (N=70). In adjusted models, there were no significant differences in suicidal ideation between intervention groups at baseline (Table 4), and the overall proportion of patients expressing SI decreased over the study period regardless of intervention group (OR: 0.44, 95% CI: 0.28-0.71). The intervention $\times$ time interaction term indicated that the reduction in proportion of patients expressing SI was greater among CAREPATH participants compared to EUC (OR: 0.51, 95% CI: 0.24-1.07). Although the intervention $\times$ time interaction was not significant at the $p=0.05$ level ($p=.074$), the absolute difference in proportion of suicidal ideation between groups was substantial: 63.6% of EUC participants, compared to 31.3% of CAREPATH participants, continued to express suicidal ideation after one year (Figure 1).

Discussion

Suicidal ideation is reported by one in eight older Medicare home health patients. The primary finding of this study was that among such patients, suicidal ideation was more likely to resolve in patients under the care of nurses randomized to the CAREPATH intervention in comparison to patients receiving usual care. This reduction in suicidal ideation extended beyond brief home health episodes (averaging 62.6 days), becoming more clinically substantial over one year. Consistent with prior studies of home-bound older adults, greater functional limitation and perception of being a burden to others was associated with greater likelihood of suicidal ideation at baseline; however, greater medical comorbidity did not predict greater likelihood of suicidal ideation at baseline or over time.

Building on prior investigation (Bruce *et al.*, 2015), the current study is the first to focus specifically on course of suicidal ideation in the CAREPATH trial. This study found that differences in suicidal ideation between intervention and usual care participants grew gradually over a year, controlling for level of baseline depression. This finding is particularly notable given the high-risk sample of home health patients with substantial psychological and medical burden, among whom suicidal ideation may be a persistent symptom (Raue *et al.*, 2007; Van Orden *et al.*, 2014). Indeed, 94% of participants with suicidal ideation had major or minor depression and over half of participants were taking anti-depressant medications at baseline, suggesting that comprehensive intervention, incorporating pharmacologic and psychosocial approaches, might be more effective at addressing suicidality than pharmacologic intervention alone.

Patients in this study received relatively short-term (averaging 62.6 days) episodes of home visiting nurse care, often following hospitalization. The intervention's emphasis on managing depression as a chronic illness may thus explain, in part, long-term differences in suicidal ideation between intervention groups despite short-term care. Specifically, the CAREPATH approach focuses not on specific treatment regimens but on promoting awareness of patients' mental well-being by encouraging consistent monitoring of depressive symptoms and better coordination between care providers and care settings (Bruce *et al.*, 2011a). Likewise, CAREPATH includes explicit guidelines for assessing and responding to suicide risk, procedures which may or may not be clearly defined in usual practice.

Furthermore, CAREPATH nurses received ongoing supervision that reinforced training in suicide risk assessment. Care management may thus reduce suicidal ideation by enhancing recognition of suicide-related and other depressive symptoms, connecting patients to appropriate mental health care, and improving transitions between post-acute and other care settings. In this way, the CAREPATH approach mirrors transitional care models that focus on improving continuity across acute and post-acute care settings (Coleman *et al.*, 2006; Trachtenberg and Ryvicker, 2011).

Consistent with interpersonal theories of suicidal ideation (Van Orden *et al.*, 2010), depression care management may also influence suicidal ideation in the long-term by strengthening social support and self-management of depressive symptoms. Among other core clinical functions, CAREPATH nurses are trained to educate families about depression care and to help patients set attainable depression treatment and functional goals. By helping to dispel misconceptions regarding depression, and improving confidence in functional abilities, CAREPATH may help decrease patients' feelings of being a burden to others and improve mental health trajectories. In support of this hypothesis, we found that high perceived burdensomeness and greater IADL limitations were related with significantly higher likelihood of suicidal ideation. Because perceived burdensomeness and functional limitations were only measured at baseline, we were unable to evaluate whether changes in these constructs might mediate intervention effect on suicidal ideation; however, previous work suggests that interventions that directly or indirectly help enhance social interactions may be effective at reducing perceived burdensomeness and suicidal ideation (Van Orden *et al.*, 2010).

Study results should be interpreted in light of potential limitations. First, the study sample includes patients from six home care agencies, all within the US. While the agencies are heterogeneous in terms of region and size, they cannot be considered representative of all home care agencies, limiting generalizability. Second, study participants represent a selected high-risk sample of older adults who were nonetheless cognitively and physically healthy enough to provide consent. The high level but limited range of CDS scores in the sample may have prevented detection of differences in suicidal ideation related to medical comorbidity. Third, measurement of suicidal ideation was based on a single item from the HAM-D, providing a minimal, albeit clinically relevant, assessment of suicide risk. Lastly, significant attrition and limited sample size likely limit generalizability and power to detect significant group differences. However, analysis showed that attrition was not related to suicidal ideation or intervention group and thus was not likely to have significantly biased results. Despite concerns regarding sample size, models were able to detect marginally significant differences in suicidal ideation between intervention groups over time.

Cluster randomization of nursing teams and longitudinal evaluation of older adults at high risk for suicidal ideation strengthen confidence in study findings. Moreover, mixed-effects longitudinal models help account for correlation of individual responses over time and mitigate some bias introduced by missing data (Laird and Ware, 1982; Gibbons, Hedeker, DuToit, 2010). By allowing analysis of participant data for those who did not complete all study assessments (average number of assessments was three of four), mixed-effects models minimize selection bias from dropout.

This study provides further evidence of the potential effectiveness of depression care management strategies as implemented in community settings. From an administrative perspective, the Depression CAREPATH is a potentially scalable intervention, in that it does not increase the duration or number of nurse home visits or patient length of stay, and does not require nurses specializing in psychiatric care (Bruce *et al.*, 2015). Given shortages of mental health care providers (Institute of Medicine, 2012) and the inadequacies of standard approaches in recognizing and addressing depression and suicidal ideation among older adults (Harman *et al.*, 2001; Szanto *et al.*, 2003; Alexopoulos, 2005), depression care management may be an important element in home care and other settings. Future work is warranted to explore CAREPATH effectiveness in more diverse settings. It is also important to determine the pathways by which depression care management influences suicidal ideation, whether by addressing factors such as patients' perceived burdensomeness or another mechanism. Such findings would help to distill key elements of suicide prevention among older adults in home care.

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Key points

1) Suicide ideation was reported by 23% of older Medicare home health patients who screened positive for depression. 2) During 12-month follow-up, participants treated by nurses randomized to intervention care reported substantially less suicidal ideation compared to patients in usual depression care. 3) Perceived burdensomeness, major depression, and functional disabilities at baseline were associated with greater likelihood of suicidal ideation, but medical burden was not related to likelihood of suicidal ideation.

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Figure 1. Course of suicidal ideation among patients expressing passive or active suicidal ideation at baseline (N=70)

Table 1

Baseline Participant Characteristics by Suicidal Ideation

	Total	No SI	Passive SI	Active SI	p-value
	N=306	N=236	N=61	N=9	
Sociodemographics					
Age, mean (sd)	76.5 (8.0)	76.1 (7.8)	78.3 (8.8)	74.7 (5.1)	0.128
65 to 74	144 (47.1)	114 (48.3)	26 (42.6)	4 (44.4)	
75 to 84	108 (35.3)	84 (35.6)	19 (31.2)	5 (55.6)	
85	54 (17.7)	38 (16.1)	16 (26.2)	0 (0.0)	
Minority race	97 (31.7)	78 (33.1)	16 (26.2)	3 (33.3)	0.591
Female	213 (69.6)	167 (70.8)	40 (65.6)	6 (66.7)	0.698
Education yrs, mean (sd)	12.0 (3.5)	12.1 (3.5)	11.5 (3.1)	11.4 (3.5)	0.409
Married	93 (30.4)	71 (30.1)	19 (31.1)	3 (33.3)	0.966
Poverty	121 (39.5)	91 (38.5)	26 (42.9)	4 (44.4)	0.809
Clinical characteristics					
CDS, mean (sd), [range: 0-18]	6.0 (3.0)	6.1 (2.8)	5.9 (3.7)	5.0 (3.6)	0.550
MMSE, mean (sd), [range: 0-30]	26.7 (2.6)	26.9 (2.5)	26.4 (3.0)	25.3 (3.9)	0.097
# Mobility limitations	2.2 (1.0)	2.2 (1.0)	2.4 (0.9)	2.1 (1.1)	0.358
# IADL limitations	3.3 (1.6)	3.3 (1.6)	3.7 (1.4)	3.1 (2.1)	0.117
# ADL limitations	1.4 (1.6)	1.3 (1.5)	1.8 (1.7)	1.1 (1.4)	0.113
Depression diagnosis					
MDD		60 (25.4)	43 (70.5)	9 (100.0)	<.001
Minor		82 (34.7)	14 (23.0)	0 (0.0)	
Not depressed		94 (39.8)	4 (6.6)	0 (0.0)	
HAM-D	14.2 (7.8)	12.1 (6.7)	20.4 (6.6)	27.8 (5.6)	<.001
Perceived burdensomeness, mean (sd) [range: 0-35]	9.4 (6.1)	7.7 (5.2)	13.9 (9.3)	18.7 (12.0)	<.001
Antidepressant prescribed	159 (52.0)	119 (50.4)	35 (57.4)	5 (55.6)	0.618
Referral Source					0.062
Hospital	144 (47.1)	116 (49.2)	21 (34.4)	7 (77.8)	

	Total	No SI	Passive SI	Active SI	p-value
	N=306	N=236	N=61	N=9	
N (%) or Mean (SD)					
SNF/Rehab	88 (28.8)	70 (29.7)	18 (29.5)	0 (0.0)	0.113
Community	72 (23.5)	48 (20.3)	22 (36.1)	2 (22.2)	
Unknown	2 (0.7)	2 (0.9)	0 (0.0)	0 (0.0)	
Intervention group					
CAREPATH	185 (60.5)	150 (63.6)	30 (49.2)	5 (55.6)	
Usual Care	121 (39.5)	86 (36.4)	31 (50.8)	4 (44.4)	

CDS: Chronic Disease Scale
HAM-D: 24-item Hamilton Rating Scale for Depression

Table 2

Odds of baseline suicidal ideation in total sample (N=306)

	OR	95% CI	p-value
Time	0.76	(0.61, 0.96)	0.020
Intervention Group (1= CAREPATH)	0.54	(0.25, 1.19)	0.127
Minority race	0.36	(0.14, 0.93)	0.036
Age (baseline)	1.03	(0.98, 1.09)	0.225
Baseline MDD	6.55	(2.76, 15.53)	<.001
Perceived burdensomeness	1.12	(1.06, 1.18)	<.001
# IADL limitations	1.39	(1.04, 1.85)	0.024
Medical burden (CDS)	0.95	(0.84, 1.07)	0.410

Estimates from logistic mixed-effects models with individual level random intercepts. Includes covariates found to be significant confounders of the relationship between intervention and SI or hypothesized predictors of SI.

MDD: Major Depressive Disorder; IADL

Table 3
Odds of suicidal ideation over time associated with perceived burdensomeness, comorbidity, and functional limitations (N=306)

	OR	95% CI	p-value
Burdensomeness (PBQ score)	1.21	(1.12, 1.32)	<.001
Burdensomeness × time	0.99	(0.96, 1.02)	0.341
Comorbidity (CDS score)	0.98	(0.80, 1.20)	0.849
Comorbidity × time	0.98	(0.92, 1.05)	0.631
Functional disability (# IADL limitations)	1.51	(0.99, 2.28)	0.053
Functional disability × time	0.95	(0.83, 1.08)	0.421

Estimates from logistic mixed-effects models with individual-level random intercepts

Adjusted for age, race (white vs. minority), baseline major depression, time, intervention group

Table 4

Odds of suicidal ideation during follow-up among those with suicidal ideation at baseline (N=70)

	OR	95% CI	p-value
Time	0.44	(0.28, 0.71)	0.001
Intervention (1=CAREPATH)	3.18	(0.39, 26.1)	0.240
Intervention × time	0.51	(0.24, 1.07)	0.074

Estimates from logistic mixed-effects models with individual-level random intercepts

Adjusted for age, race (white vs. minority), baseline major depression, perceived burdensomeness, medical comorbidity (CDS scores), and IADL limitations

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