Retrospective Review

Prevalence of Suicidal Ideation in Patients with Chronic Non-Cancer Pain Referred to a Behaviorally Based Pain Program

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Background: Patients with chronic pain often experience co-occurring depression and in some cases suicidal ideation. It is critical to discover risk factors for suicide in this vulnerable patient population.

Objective: To assess the prevalence of suicidal ideation and identify potential risk factors in patients with chronic non-cancer pain.

Study Design: Retrospective chart review.

Setting: Four hundred and sixty-six patients with chronic non-cancer pain referred to a behaviorally based pain program in a community health system.

Methods: Data collected included pain intensity and level of pain interference (Brief Pain Inventory), pain duration, pain site, depression level (Beck Depression Inventory Fast Screen for Medical Patients), anxiety (Beck Anxiety Inventory), personal and family psychiatric and substance use disorder history, level of isolation, and demographic data. Univariate and logistic regression analyses were performed.

Results: Results showed a high rate of suicidal ideation in this patient population (28%). Univariate analyses stratified by level of suicide (no suicidal ideation or passive/active suicidal ideation) revealed statistically significant group differences on pain location (extremity $P = 0.046$, generalized $P = 0.047$), work disruption ($P = 0.049$), social withdrawal ($P < 0.001$), pre-pain history of depression ($P < 0.001$), family history of depression ($P < 0.001$), and history of sexual/physical abuse ($P < 0.001$). Logistic regression revealed that history of sexual/physical abuse (Beta = 0.825; $P = 0.020$; OR = 2.657 [95% CI = 1.447 – 4.877]), family history of depression (Beta = 0.471; $P = 0.006$; OR = 1.985 [95% CI = 1.234 – 3.070]), and being socially withdrawn (Beta = 0.482; $P < 0.001$; OR = 2.226 [95% CI = 1.431 – 3.505]) were predictive of suicidal ideation.

Limitations: Measure of depression was not included in data analysis to reduce effect of co-linearity. Also the study population was a specialty pain clinic allowing for possible subject selection bias.

Conclusions: Results of this study are consistent with the prevailing literature on pain and suicide demonstrating a high prevalence of suicidal ideation in the chronic pain population. Novel predictive variables were also identified that will provide the basis for developing a risk stratification model that can be further tested prospectively in chronic pain patients.

Key words: Chronic pain, suicide, depression

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Patients suffering from chronic pain often present with multiple comorbidities, including depression, anxiety, substances use disorder, and suicidal ideation. The prevalence rates of concomitant major depression in patients with chronic pain are relatively high, ranging from 13% to 85%, depending on the clinical setting (1). Several studies have demonstrated a moderate to strong association between depression and pain, revealing that pain patients are more likely to be depressed than patients without pain (2-4).

Pain and Suicide

As of 2009, suicide was the tenth leading cause of death across all ages, with annually over 36,000 people dying from suicide in the United States, and greater than 370,000 patients seen in the emergency room departments with self-inflicted injuries (5).

There is a moderate level of published evidence suggesting a high prevalence of suicidal ideation in patients with chronic pain (6-14). For example, Hitchcock et al (6) discovered that 50% of chronic pain patients had serious thoughts of committing suicide due to their pain disorder, while Fishbain (9), in reviewing a number of studies on suicidal ideation and pain, found that there were specific pain-related risk factors such as pain severity and severe comorbidity including depression, accounting for the increased rate of suicidal behavior in chronic pain patients. Smith et al (10) evaluated suicidal behavior and ideation in a cross-sectional design of 153 patients with chronic non-cancer pain (CNCP). They discovered that 19% of this population reported current passive suicidal ideation, 13% had active thoughts, 5% had a plan for suicide, and 5% reported a previous suicide attempt. It is noteworthy that drug overdose was the most commonly reported plan for committing suicide (75%), which is very relevant given the burgeoning rate of opioid-related fatal poisonings (14). Tang and Krane (15) conducted a systematic review of the literature on pain and discovered that the risk of successful suicide was doubled in chronic pain patients relative to non-pain controls. Risk factors for suicide included family history of suicide, previous suicide attempt, gender (female), and presence of comorbid depression. Pain specific risk factors included location (low back and widespread pain), high pain intensity, pain duration, and presence of co-occurring insomnia. A recent study by Racine et al (16) discovered additional pain associated and general risk factors of suicidal ideation. Eighty-eight patients with CNCP completed a comprehensive intake at 3 pain clinics. Twenty-four percent of the patients reported experiencing suicidal ideation. Risk factors of suicidal ideation included being unemployed or disabled, pain-related helplessness, use of illicit drugs to manage pain, prescription of antidepressants, and patients' perception that they had poor mental health. Depressive symptoms did not predict suicidal ideation. Other possible mediators between pain and suicidal ideation include sleep disorders (10,15) and pain catastrophizing (17,18).

It was the specific aim of this study to assess the prevalence of suicidal ideation and identify potential risk factors in a large sample of patients with CNCP referred to a behaviorally based pain program.

Methods

Patients

Participants were all patients referred to a behaviorally based pain management program from January 1, 2007, through January 5, 2011. This program emphasizes a biopsychosocial approach and includes physical therapy, occupational therapy, and cognitive behavioral therapy. Four hundred sixty-six new patients were evaluated during this timeframe.

Procedure

The Reading Hospital and Medical Center Institutional Review Board approved this project. This was a retrospective chart review completed by a third-year internal medicine resident with experience in pain management and an experienced pain research nurse. To assess inter-rater reliability both reviewers reviewed every twentieth chart. The senior researcher addressed any discrepancies between the reviewers.

Measures

Demographics

Demographic characteristics included age, gender, socioeconomic status, ethnicity, marital status, and education level.

Beck Depression Inventory – Fast Screen for Medical Patients

The Beck Depression Inventory – Fast Screen for Medical Patients (BDI-FS) is a 7-item, self-report inventory designed to screen for depression in adolescents and adult medical patients. Items were extracted from the Beck Depression Inventory-II (BDI-II) which measures

depression severity based on psychological non-somatic criteria for major depressive disorders as derived from the *Diagnostic and Statistical Manual IV.* Somatic symptoms of depression were excluded to improve specificity for medical patients. Items are scored on a 4 point Likert scale (0 – 3) with a range of 0 – 21. It is well validated and reliable (19). In one study (20) the BDI-FS was compared to the BDI-II in a pain population. Results indicated that the BDI-FS demonstrated good psychometric properties and had a strong agreement with the BDI-II and equal ability to detect clinical change. Based on question 7 of the BDI-FS on suicidal ideation, patients were placed in one of 3 groups: no suicidal ideation (NSI), passive suicidal ideation (PSI), or active suicidal ideation (ASI).

Brief Pain Inventory-Short Form

The Brief Pain Inventory-Short Form (BPI-SF) includes 2 dimensions: pain intensity and pain interference (21). We used the average pain intensity which consists of a 10-point scale (0 = "no pain" and 10 = "pain as bad as you can imagine"). The pain interference dimension measures interference on a 10-point scale in 7 domains and we focused, for the purpose of this study, on general activity 0 = "does not interfere" and 10 = "completely interferes").

Personal/Family History Checklist/Chart Review

Each patient evaluated in the behaviorally based pain management program undergoes a comprehensive, structured psychological interview and review of previous medical records. Prior to the initial evaluation, extensive medical and psychiatric records are obtained and reviewed. The structured interview included past, current, and family history of psychiatric disorders; history of sexual/physical abuse (prior to pain onset). and substance use disorders. These data were patient self-reported and if possible corroborated by family members and medical record review. The interview also assessed in each patient common consequences of living with chronic pain which included work/school disruption, sleep disturbance both pre and post onset of pain, family disruption (discord), social withdrawal/isolation (level of social activity pre as compared to post onset of pain--"as a result of your pain have you become socially withdrawn or isolated?"), and activity interference. A full mental status examination was also conducted. In addition, each patient completed a questionnaire on past medical and surgical history, health habits, current medications, medication allergies, and history of mental illness and substance abuse treatment along with family history of depression, suicidal thoughts and attempts, and substance misuse. The chart review included recording pain diagnosis, medication use/misuse, medical and psychiatric history, personal history of pre-pain depression, past history of suicidal thoughts/attempts, substance abuse, and nicotine use.

Statistical Analysis

Statistical analysis was performed with SPSS version 21.0. Analysis consisted of several parts. First, a univariate analysis was conducted to examine the frequencies (counts) of patients in each of the 3 suicide groups. This analysis was performed to determine the number of passive and active suicide patients in order to determine if combining groups was necessary to facilitate further analysis. This analysis determined that there were data available on 466 patients, of which 335 (71.9%) were scored as not suicidal, 120 (25.8%) were coded as having passive suicidal ideation, and 11 (2.3%) were coded as active suicidal ideation. Due to the small sample in the ASI group they were combined with the PSI group.

The second step in the analysis was a univariate analysis performed to establish group differences or associations between the demographic, pain, and historical variables against the 2 level suicide variable. Dichotomous or discrete level data were compared with chi-square test of association and continuous data were compared using a group t-test. Given the exploratory nature of this analysis, there was no correction for multiple comparisons and while *P*-values less than 0.05 were considered significant, this analysis also established trend significance for those *P*-values less than 0.10 for inclusion into further statistical models.

Lastly, a logistic regression was calculated using those variables that were found to be trend significant (*P*-values less than 0.10) from the univariate analysis. This model, which included statistically significant variables from the demographic, pain, or historical variable lists were compared against the 2 levels of suicide. The model was used that included all variables on the first step, and removed variables with backwards elimination based on the significance of the Wald statistic. Those variables that remained in the model after the final step odds ratios with 95% confidence intervals were calculated and reported.

Results

Inter-rater reliability was satisfactory (K = .87). The results for the demographic variables are presented in

Table 1. Demographic and descriptive information.

Variable	Value	Mean (or Count)	Standard Deviation (or %)
Age		47.95	12.73
BDI Total		6.88	4.45
Gender	Male	185	39.7
	Female	278	59.7
	Not recorded	3	0.6
Race	Hispanic	23	4.9
	White	435	93.3
	Black	6	1.3
	Other	2	0.4
Marital Status	Married /Partnered	305	65.5
	Separated	17	3.6
	Divorced	64	13.7
	Never Married/Single	61	13.1
	Widowed	15	3.2
	Not recorded	4	0.9
Level of Education	Grade 6 or less	2	0.4
	Grade 7-12 with no degree	51	10.9
	HS graduate or equivalent	215	46.1
	Part College	70	15.0
	Graduated 2 year college	44	9.4
	Graduated 4 year college	48	10.3
	Graduate/Professional school	8	1.7
	Completed Graduate school	15	3.2
	Not recorded	13	2.8
Employed	No	328	70.4
	Yes	135	29.0
	Not recorded	3	0.6
Beck Depression grouping	Minimal	126	27.0
	Mild	108	23.2
	Moderate	101	21.7
	Severe	13	28.1

Table 1 including data for age, gender, race, marital status, education level, employment, and the BDI-FS groupings of Minimal, Mild, Moderate, or Severe.

Analysis of mean differences between the NSI and Passive/Active Suicidal Ideation (PASI) groups was conducted and reported in Table 2. There were no statistically significant differences found for age (P = 0.554), average pain (P = 0.268), or general activity index (P = 0.127). There was trend significance between groups on the pain duration variable with the NSI group having a shorter duration of mean pain (in years) than the PASI group (8.55 ± 9.48 versus 10.35 ± 10.11 respectively, P = 0.082). This variable, while not meeting the statistically significant criteria, did meet inclusion criteria for the logistic regression (P-values less than 0.10) and was passed to the follow-up analysis.

Demographic analysis between NSI and PASI groups revealed no statistically significant differences and the count data can be found in Table 3. Other discrete analyses for the pain variables as well as social activity and psychiatric history variables are displayed in Table 4. The pain location variables of spine and head were not statistically significant; however, the abdomen was trend significant (P = 0.080) and extremity and

Table 2. *Results of the Means univariate analysis stratified by level of suicide.*

Variable	No SI			Passive/Active SI			*P*-value
	n	Mean	SD	n	Mean	SD	
Age	335	48.17	12.90	131	47.40	12.29	0.554
Pain Duration	323	8.55	9.48	120	10.35	10.11	0.082
Average Pain	318	6.52	1.75	125	6.72	1.58	0.268
Activity Intensity	320	7.47	2.21	128	7.81	1.95	0.127

Table 3. *Results of the discrete variable, univariate analysis stratified by level of suicide.*

Variable	Value	No SI		Passive/Active SI		*P*-value
		Count	Percent	Count	Percent	
Gender	Male	135	73.0	50	27.0	0.744
	Female	199	71.6	79	28.4	
Race	Hispanic	15	65.2	8	34.8	0.428
	White	315	72.4	120	27.6	
	Black	3	50.0	3	50.0	
	Other	2	100.0	0	0.0	
Marital Status	Married /Partnered	220	72.1	85	28.9	0.164
	Separated	8	47.1	9	52.9	
	Divorced	46	71.9	18	29.1	
	Never Married/Single	47	77.0	14	23.0	
	Widowed	12	80.0	3	20.0	
Level of Educ.	Grade 6 or less	2	100.0	0	0.0	0.194
	Grade 7-12 with no degree	34	66.7	17	33.3	
	HS graduate or equivalent	162	75.3	53	24.7	
	Part College	53	75.7	17	24.3	
	Graduated 2 year college	27	61.4	17	38.6	
	Graduated 4 year college	38	79.2	10	20.8	
	Graduate/Professional school	4	50.0	4	50.0	
	Completed Graduate school	9	60.0	6	40.0	
Employ.	No	230	70.1	98	29.9	0.179
	Yes	103	76.3	32	23.7	
BDIFS grouping	Minimal	123	97.6	3	2.4	0.001
	Mild	94	88.7	12	11.3	
	Moderate	71	71.0	29	29.0	
	Severe	45	34.6	85	65.4	

generalized pain were statistically significant ($P = 0.046$ and $P = 0.047$, respectively). All 3 variables were passed to the logistic regression analysis. All of the remaining variables for social, family, and personal psychiatric history as well as personal history of suicide were either trend significant or statistically significant and were also passed to the logistic regression.

The logistic regression was performed using the significant or trend significant variables previously reported on and the Wald Statistic and *P*-value for each variable can be found in Table 5. The values that are presented in Table 5 are those that remained in the model after backwards elimination was completed, and included socially withdrawn ($P = 0.001$), family history of depression ($P = 0.006$), and history of sexual/physical abuse ($P = 0.020$). Odds ratios were calculated for each as was the 95% confidence intervals (reported in Table 6).

Table 4. *Univariate analysis of discrete variables (pain, psychiatric history, suicide).*

Variable	Value	No SI		Passive/Active SI		*P*-value
		Count	Percent	Count	Percent	
Pain Location: Spine	No	111	68.9	50	31.1	0.335
	Yes	221	73.2	81	26.8	
Pain Location: Head	No	297	71.4	119	28.6	0.657
	Yes	35	74.5	12	25.5	
Pain Location: Abdomen	No	323	72.4	123	27.6	0.080
	Yes	9	52.9	8	47.1	
Pain Location: Extremity	No	201	68.6	93	31.4	0.046
	Yes	131	77.1	39	22.9	
Pain Location: Generalized	No	253	74.2	88	75.8	0.047
	Yes	79	64.8	43	35.2	
Sleep Disorder	No	77	79.4	20	20.6	0.065
	Yes	258	69.9	111	30.1	
Work/School Disruption	No	139	76.3	40	23.7	0.049
	Yes	206	69.4	91	30.6	
Family Discord	No	278	73.7	99	26.3	0.067
	Yes	57	64.0	32	36.0	
Socially Withdrawn	No	141	81.0	33	19.0	<0.001
	Yes	194	66.4	98	33.6	
Pre-Pain Depression	No	174	77.7	50	22.3	<0.001
	Yes	92	61.7	57	38.3	
Post-Pain Depression	No	53	96.4	2	3.6	<0.001
	Yes	279	68.9	126	31.1	
Family History Depression	No	155	80.3	38	19.7	<0.001
	Yes	78	61.4	49	38.6	
Pre-Pain history of Suicide	No	321	73.5	116	26.5	0.003
	Yes	14	48.3	15	51.7	
History of Suicide Attempts	No	324	72.6	122	27.4	0.085
	Yes	11	55.0	9	45.0	
Family History of Suicide Attempts	No	322	72.7	121	27.3	0.093
	Yes	13	56.5	10	43.5	
History of Sexual/Physical Abuse	No	309	74.3	107	25.7	0.001
	Yes	25	52.1	23	47.9	

Discussion

The results of the study replicated earlier published work in this area. The prevalence of suicidal ideation was high in this population with 25.8% endorsing passive suicidal ideation and 2.3% endorsing active suicidal ideation. This is comparable to the results of Smith et al (10). Previously identified risk factors for suicide in pain patients were also seen in this study and either were statistically significant or trend significant. This included post-pain or co-occurring depression ($P < 0.001$), pain location including abdominal pain ($P = .080$) and generalized ($P = .047$), sleep disorder ($P = 0.065$), pain duration ($P = .082$), history of suicide attempts ($P = 0.085$), and family history of suicide attempts ($P = 0.093$). Other identified risk factors were not replicated in this study, including female gender ($P = 0.744$) and pain intensity ($P = 0.268$). With respect to gender, while most studies of suicide have indicated that female gender is a risk

Table 5. *Logistic regression variables with model significance level at last iteration.*

Variable	Wald Statistic	*P*-value
Pain Location - Abdominal	1.535	0.215
Pain Location – Extremity	1.727	0.189
Pain Location - Generalized	0.905	0.342
Sleep Disorder	1.518	0.218
Work/School Disruption	0.663	0.416
Family Discord	1.749	0.186
Socially Withdrawn	11.421	0.001
Pre-Pain Depression	1.684	0.431
Family History of Depression	10.096	0.006
Pre-Pain History of Suicide Ideation	0.888	0.346
History of Suicide Attempts	0.193	0.660
Family History of Suicide Attempts	1.438	0.230
History of Sexual/Physical Abuse	5.378	0.020

Table 6. Variables remaining in logistic regression, odds ratios with 95% confidence intervals.

Variable	Beta Coefficient	Odds Ratio	95% Confidence Interval
History of Sexual/Physical abuse	0.825	2.657	1.447 – 4.877
Family History of Depression	0.471	1.985	1.234 – 3.070
Socially Withdrawn	0.482	2.226	1.413 – 3.505

factor, a recent systematic review (22) revealed that male gender was significantly associated with suicide (OR = 1.76, 95% CI = 1.08 – 2.86). Gender as a risk factor clearly requires further investigation.

This study revealed undiscovered potential risk factors including family history of depression ($P < 0.001$), pre-pain history of depression ($P < 0.001$), and social isolation/withdrawal ($P < 0.001$). Logistic regression revealed that history of sexual/physical abuse (OR = 2.657; 95% CI = 1.447 – 4.877), family history of depression (OR = 1.985; 95% CI = 1.234 – 3.070), and being socially withdrawn (OR = 2.226; 95% CI = 1.413 – 3.505) were statistically significant predictors of suicidal ideation in our study population. While family history of depression and history of sexual/physical abuse are novel findings in the pain population to our knowledge, socially withdrawn may be reflective of a known risk factor of suicide, "thwarted belongingness" from the "Interpersonal Theory of Suicide" (23,24). The "Interpersonal Theory of Suicide" proposes that there are 2 factors, thwarted belongingness (unfulfilled need for social interaction/connectedness) and perceived burdensomeness (perceiving oneself as a burden or a liability to others), which significantly contribute to the context that leads to suicidal thoughts and possible lethal action. Several recent studies in the pain population have supported this theory. Wilson et al (25) evaluated 303 patients referred to a chronic pain rehabilitation program. They measured a variety of factors including measures of belongingness and burdensomeness. They discovered that distress in interpersonal relations and self-perceived burden to others were strong predictors of suicidal ideation after adjusting for demographics, pain severity and duration, functional limitations, pain catastrophizing, and depression. In a study by Kranzler et al (26), 113 patients referred to a clinical health psychology clinic were evaluated. Measurements included depression, pain severity, one question on perceived burdensomeness, and suicidal ideation. A logistic regression model revealed that perceived burdensomeness was the sole predictor of suicidal ideation.

Results from Kranzler et al (26) and Wilson et al (25), along with our data on social withdrawal suggests that there is a potential model of suicidal ideation that may be very pertinent to predicting who is at risk for suicidal ideation in the chronic pain population. In the "Interpersonal Theory of Suicide," desire for suicide is caused by the presence of these 2 interpersonal constructs (thwarted belongingness and perceived burdensomeness) and the capability to engage in sui-

cidal behavior is separate from the desire to engage in suicidal behavior. It is further hypothesized that the capability for suicidal behavior develops in response to repeated exposure to physically painful and/or fear-inducing "experiences" (23). This is very relevant to the pain population as 2 known risk factors for suicide are pain duration (15) and intensity (9,15). Although pain duration and pain intensity were not statistically significant in our study, but trend significant, patients with a longer duration of pain that is poorly controlled may be at heightened risk for committing suicide. Likewise, the new finding of history of sexual/physical abuse may add another dimension of psychological pain that increases the risk of actual suicide attempt. Family history of depression and pre-pain history of depression may render an individual more predisposed to depression when under stress. There is evidence (27) that a family history of completed suicide and psychiatric illness independently and significantly increases suicide risk (OR = 2.58, 95% CI = 1.84 – 3.61 and OR = 1.31, 95% CI = 1.19 – 1.45, respectively). While these are not variables that can be altered, they may be meaningful factors included in an ultimate suicide risk assessment tool.

Limitations

There are several limitations that need to be discussed. First of all, direct measure of depression was not included in the data analysis. The BDI-FS is a 7-question instrument, with one question on suicidal ideation. The BDI-FS was utilized in this clinic as it was designed to exclude somatic vegetative symptoms of depression, which may be very common in non-depressed medical patients. The BDI-FS is thought to be a more accurate assessment of depression in a medical population. Not excluding the question on suicidal ideation would lead to co-linearity and clearly bias the results. Removing the question and using the sum of the remaining questions as a measure of depression would leave us with an instrument that is non-validated and, therefore, may not be reflective of depression. Also, there have been a number of studies demonstrating that depression is moderately associated with suicidal ideation (15,28-30). If depression accounted for a large percentage of the variance, this could mask other, subtler, variables that are predictive of suicide. On the other hand, one could argue that it is more important to identify variables predictive of suicidal ideation that account for a significant amount of variance above that attributable to depression. In addition, assessing suicidal ideation with only a single item from a depression screening tool poses methodological challenges. There are a number of validated suicidal specific scales available such as the Columbia—Suicide Severity Rating Scale (31) and the Beck Scale for Suicidal Ideation (32), which could be utilized in prospective studies to more accurately assess this complex phenomenon. However, one recent study did demonstrate that the single suicide question from several depression screening tools did positively correlate with the Beck Scale for Suicidal Ideation (33).

Other limitations include the population studied. The patients in our study were from a behaviorally based pain program that may not be representative of traditional intervention oriented or other types of pain clinics. However our study, like many studies in this area, assessed patients from a specialty pain clinic. There is a tendency towards subject bias, in that often times patients referred to pain clinics have significant psychiatric comorbidities, which triggered the referral to the pain clinic in the first place. Studies of this nature need to be performed in non-pain clinic settings such as primary care clinics where the majority of pain patients are treated (34). Also, our study population was primarily white, such that we cannot fully generalize these results to other races. Additional limitations include those inherent in any type of retrospective study. For example in our study we could not directly measure known mediators of suicide such as hopelessness, burdensomeness, or catastrophizing.

Conclusions

This study adds to the previous work in this area that demonstrates that patients with chronic pain have a high occurrence of suicidal ideation. Results of the study replicated certain previously identified risk factors and revealed novel risk factors, such as family history of depression, history of sexual/physical abuse, and social withdrawal. Future studies need to be prospective in nature and conducted in non-pain clinic settings, with an ultimate goal of developing a short, validated screening tool for suicide risk assessment in patients with chronic pain.

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