

# Predictor Variables for Six Forms of Suicidality in Patients with Acute and Chronic Pain

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## Abstract

**INTRODUCTION:** Chronic pain patients (CPPs) are at greater risk for all forms of suicidality (FOS) (completions, attempts, etc.) versus the general population [1,2]. CPP suicide literature has however failed to develop a consistent set of FOS predictor variables but indicates that they may be differentially distributed among pain types [3]. Study objectives were to develop variable predictor models for six FOS: suicide plan, wanting to die history, suicide attempt history, wants to die because of pain (WTDBOF) or because life is hard, and recent suicide ideation (RSI).

**METHODS:** These FOS questions were administered to 341 CPPs and 326 acute pain patients (APPs). Patients affirming /not affirming these FOS were compared statistically on a wide range of variables including the BHI 2 [4]. Significant variables (p<0.001) were then utilized as independent variables in logistic regression models for each FOS for CPPs and APPs.

**RESULTS:** The developed models classified 87-95% of the patients correctly and all models predicted at better than the base rate except for the WTDBP and RSI FOS. For both APPs and CPPs, FOS were predicted by other FOS. Predictor variables were differentially distributed between APPs and CPPs and between FOS. Contrary to the psychiatric literature, no demographic variables except employment predicted any FOS. Some predictor variables were novel to the suicide literature, e.g., perseverance, somatic complaints, etc.

## DISCUSSION AND CONCLUSIONS:

- This is the first study to demonstrate that predictor variables differ between APPs and CPPs for suicidality items.
- Demographic variables historically linked to suicidality were not shown to be predictive for APPs' and CPPs' suicidality items (except unemployment).
- Contrary to some previous pain literature, pain levels were only predictive for one suicidality item in APPs (history of suicide attempts).
- Suicidality items are significantly intercorrelated and predictive of each other in APPs and CPPs. This has clinical utility for alerting the clinician to the potential presence of very serious forms of suicidality such as suicide plan.
- This study has identified a number of variables predictive of suicidality not previously identified in the pain literature (functional status, substance abuse, poor family relationships/lack of support, diagnosis of borderline syndrome, childhood physical abuse, anxiety, aggression/violence history, psychosis [hearing voices], previous history of self injury [cutting self], low perseverance/self efficacy, chronic maladjustment).
- The models for "history of wanting to die" for APPs and CPPs, history of suicide attempts for CPPs, and wanting to die because life is hard for APPs and CPPs predicted these suicidality items at "better than the base rule." This indicates that these models should be clinically useful.

TABLE 3.										
Final Model Logistic Regression Results for Significant Independent Variables with Wanting to Die Because Life is Hard as the Dependent Variable for Acute and Chronic Pain Patients										
Step $\chi^2$ (df), p value	% of Cases Predicted Correctly by the Model	Step Nagelkerke R <sup>2</sup>	Variable	Associated BHI-2 Scale	B	Wald, p value	Odds Ratio	Lower 95% CI for Odds Ratio	Upper 95% CI for Odds Ratio	
<b>ACUTE PAIN PATIENTS</b>										
71.6 (1), <0.001	82.5	.317	History of wanting to die	Not Applicable	1.6	16.9, <0.001	5.2	2.4	11.3	
19.0 (1), <0.001	86.8	.073	I belong nowhere	Family Dysfunction	1.1	6.5, 0.011	2.9	1.3	6.4	
13.7 (1), <0.001	87.7	.050	Having a suicide plan	Not Applicable	2.0	10.9, 0.001	7.6	2.3	25.2	
11.5 (1), 0.001	87.1	.041	Things are bad in my house now	Family Dysfunction	1.3	9.8, 0.002	3.5	1.6	7.7	
8.6 (1), 0.003	88.7	.029	Anger causes me to lose control	Hostility	1.1	8.3, 0.004	3.1	1.4	6.6	
5.5 (1), 0.019	88.7	.018	I won't do things, so I don't hurt myself	Anxiety	0.92	5.45, 0.020	2.5	1.2	5.4	
<b>CHRONIC PAIN PATIENTS</b>										
110.8 (1), <0.001	81.8	.411	Depression Scale	Not applicable	0.08	9.9, 0.002	1.08	1.03	1.13	
25.6 (1), <0.001	85.3	.078	History of wanting to die	Not applicable	1.8	21.7, <0.001	6.2	2.9	13.4	
15.9 (1), <0.001	83.9	.045	After setbacks, I still have hope	Perseverance	-1.7	14.6, <0.001	0.19	0.08	0.44	
14.3 (1), <0.001	86.5	.039	Things are bad in my house now	Family Dysfunction	1.4	14.3, <0.001	4.2	2.0	9.0	
12.1 (1), 0.001	88.3	.031	I am mean to people I care about	Borderline	1.3	10.4, 0.001	3.5	1.6	7.5	
8.9 (1), 0.003	88.6	.023	Wanting to die because of pain	Not applicable	1.5	8.6, 0.003	4.4	1.6	11.7	

TABLE 6.										
Final Model Logistic Regression Results for Significant Independent Variables with History of Suicide Attempt as the Dependent Variable for Acute and Chronic Pain Patients										
Step $\chi^2$ (df), p value	% of Cases Predicted Correctly by the Model	Step Nagelkerke R <sup>2</sup>	Variable	Associated BHI-2 Scale	B	Wald, p value	Odds Ratio	Lower 95% CI for Odds Ratio	Upper 95% CI for Odds Ratio	
<b>ACUTE PAIN PATIENTS</b>										
40.9 (1), <0.001	87.1	.212	Getting angry makes me lose control	Hostility	1.9	13.6, <0.001	6.8	2.5	18.7	
29.0 (1), <0.001	89.3	.135	History of self-injury	Borderline	2.1	9.0, 0.003	8.2	2.1	32.4	
22.7 (1), <0.001	88.7	.097	Chronic Maladjustment Scale	Not applicable	0.10	16.2, <0.001	1.11	1.05	1.16	
21.8 (1), 0.008	90.8	.088	Pain Range Score	Not applicable	0.35	14.0, <0.001	1.42	1.18	1.71	
9.5 (1), 0.003	92.3	.036	Recent frequent suicide ideation	Depression	2.1	17.2, <0.001	7.9	3.0	20.9	
<b>CHRONIC PAIN PATIENTS</b>										
46.3 (1), <0.001	83.9	.199	History of self-injury	Borderline	2.4	24.2, <0.001	11.4	4.3	30.2	
28.5 (1), <0.001	83.0	.110	Survivor of Violence Scale	Not applicable	0.09	24.7, <0.001	1.09	1.05	1.13	
8.9 (1), 0.003	85.3	.032	Hearing voices others don't	Somatic Complaints	1.8	11.9, 0.001	6.1	2.2	17.2	
5.0 (1), 0.025	84.5	.018	I normally have lots of energy	Borderline	-0.90	6.0, 0.014	0.41	0.20	0.84	
6.1 (1), 0.014	85.9	.022	Dizziness	Somatic Complaints	-0.88	5.7, 0.017	0.42	0.20	0.86	

TABLE 1.							
Number and Percentage of Subjects Endorsing Suicidality Items for CPPs and APPs							
	N	Yes to Having a Suicide Plan (n, %)	Yes to History of Wanting to Die (n, %)	Yes to History of Suicide Attempt (n, %)	Yes to Wanting to Die Because of Pain (n, %)	Yes to Recent Frequent Suicide Ideation (n, %)	Yes to Wanting to Die Because Life is Hard (n, %)
Rehab Acute Pain Patients	326	23 (7.06%)	81 (24.85%)	46 (14.11%)	20 (6.13%)	19 (5.83%)	62 (19.01%)
Rehab Chronic Pain Patients	341	27 (7.92%)	119 (34.90%)	70 (20.53%)	48 (14.08%)	32 (9.38%)	85 (24.93%)

TABLE 4.										
Final Model Logistic Regression Results for Significant Independent Variables with Wanting to Die Because of Pain as the Dependent Variable for Acute and Chronic Pain Patients										
Step $\chi^2$ (df), p value	% of Cases Predicted Correctly by the Model	Step Nagelkerke R <sup>2</sup>	Variable	Associated BHI-2 Scale	B	Wald, p value	Odds Ratio	Lower 95% CI for Odds Ratio	Upper 95% CI for Odds Ratio	
<b>ACUTE PAIN PATIENTS</b>										
37.2 (1), <0.001	93.6	.292	Somatic Complaints Scale	Not applicable	0.11	13.4, <0.001	1.12	1.05	1.19	
6.8 (1), 0.009	93.9	.049	Wanting to die because life is hard	Depression	1.7	8.4, 0.004	5.3	1.7	16.4	
7.0 (1), 0.008	93.3	.050	Shortness of breath without exertion	Somatic Complaints	1.5	5.7, 0.017	4.4	1.3	14.7	
5.7 (1), 0.017	95.1	.041	Stress causes muscular knots	Muscular Bracing	-1.4	5.4, 0.020	0.24	0.07	0.80	
<b>CHRONIC PAIN PATIENTS</b>										
59.1 (1), <0.001	85.9	.286	Wanting to die because life is hard	Depression	2.5	32.7, <0.001	11.7	5.0	27.2	
22.3 (1), <0.001	88.0	.096	Disappointed in bad health	Depression	2.1	16.4, <0.001	8.1	2.9	22.2	
16.8 (1), <0.001	90.9	.068	Muscles don't normally relax	Muscular Bracing	2.1	11.2, 0.001	8.3	2.4	28.4	
13.3 (1), <0.001	89.4	.051	Substance Abuse Scale	Not applicable	0.06	10.0, 0.002	1.06	1.02	1.11	
7.2 (1), 0.007	89.4	.028	Maintain health by remaining home	Functional complaints	1.2	7.3, 0.007	3.4	1.4	8.1	

TABLE 7.										
Final Model Logistic Regression Results for Significant Independent Variables with Recent Frequent Suicide Ideation as the Dependent Variable for Acute and Chronic Pain Patients										
Step $\chi^2$ (df), p value	% of Cases Predicted Correctly by the Model	Step Nagelkerke R <sup>2</sup>	Variable	Associated BHI-2 Scale	B	Wald, p value	Odds Ratio	Lower 95% CI for Odds Ratio	Upper 95% CI for Odds Ratio	
<b>ACUTE PAIN PATIENTS</b>										
33.9 (1), <0.001	94.2	.275	History of self-injury	Borderline	2.7	12.7, <0.001	15.2	3.4	68.0	
27.4 (1), <0.001	95.7	.202	The future looks good	Depression	-2.7	10.5, 0.001	0.07	0.01	0.34	
13.5 (1), <0.001	94.8	.094	I don't know myself now	Borderline	2.4	11.0, 0.001	11.4	2.7	47.8	
8.8 (1), 0.003	96.6	.058	Hearing voices others don't	Somatic Complaints	2.3	8.2, 0.004	9.7	2.0	46.2	
<b>CHRONIC PAIN PATIENTS</b>										
61.8 (1), <0.001	92.4	.358	Depression Scale	Not applicable	0.08	81.0, 0.004	1.09	1.03	1.15	
14.2 (1), <0.001	93.3	.073	Hearing voices others don't	Somatic Complaints	2.6	14.7, <0.001	12.8	3.5	47.2	
9.9 (1), 0.002	93.8	.050	I do not quit	Perseverance	-1.7	10.0, 0.002	0.18	0.06	0.52	
9.1 (1), 0.002	94.1	.044	Thinking about painful memories	Somatic Complaints	2.1	8.5, 0.003	7.9	2.0	31.5	
7.9 (1), 0.005	93.5	.038	Having lots of violent ideas	Hostility	1.8	8.1, 0.004	6.0	1.7	20.7	

TABLE 2.						
Phi Correlation Coefficients Between the Suicidality Items (APPS Above the Diagonal and CPPS Below the Diagonal)						
	Having a Suicide Plan	History of Wanting to Die	History of Suicide Attempt	Wanting to Die Because of Pain	Recent Frequent Suicide Ideation	Wanting to Die Because Life is Hard
Having a Suicide Plan	1	0.257	0.404	0.279	0.494	0.385
History of Wanting to Die	0.287	1	0.440	0.267	0.342	0.499
History of Suicide Attempt	0.254	0.150	1	0.153*	0.388	0.253
Wanting to Die Because of Pain	0.287	0.341	0.191	1	0.318	0.300
Recent Frequent Suicide Ideation	0.390	0.313	0.260	0.419	1	0.413
Wanting to Die Because Life is Hard	0.208	0.474	0.227	0.449	0.396	1

All correlations are significant at < 0.001, except for \* which is significant at < 0.01

TABLE 5.										
Final Model Logistic Regression Results for Significant Independent Variables with History of Wanting to Die as the Dependent Variable for Acute and Chronic Pain Patients										
Step $\chi^2$ (df), p value	% of Cases Predicted Correctly by the Model	Step Nagelkerke R <sup>2</sup>	Variable	Associated BHI-2 Scale	B	Wald, p value	Odds Ratio	Lower 95% CI for Odds Ratio	Upper 95% CI for Odds Ratio	
<b>ACUTE PAIN PATIENTS</b>										
91.7 (1), <0.001	81.3	.364	Depression Scale	Not applicable	0.12	19.0, <0.001	1.13	1.07	1.19	
28.6 (1), <0.001	83.7	.094	History of suicide attempt	Borderline	1.8	14.4, <0.001	5.9	2.4	14.9	
23.0 (1), <0.001	85.9	.070	Wanting to die because life is hard	Depression	2.2	22.4, <0.001	8.9	3.6	22.0	
14.0 (1), <0.001	86.5	.040	Dizziness	Somatic Complaints	1.5	13.3, <0.001	4.4	2.0	9.7	
9.3 (1), 0.002	88.0	.026	Abused by a spouse or lover	Family Dysfunction	1.5	12.6, <0.001	4.3	1.9	9.8	
9.8 (1), 0.002	88.3	.026	Symptom Dependency Scale	Not applicable	-0.1	10.2, 0.001	0.92	0.88	0.97	
6.7 (1), 0.009	89.0	.018	People anger me by being near them	Hostility	1.1	6.6, 0.01	2.9	1.3	6.5	
<b>CHRONIC PAIN PATIENTS</b>										
74.9 (1), <0.001	77.1	.272	Feeling empty and dead inside	Depression	2.1	33.6, <0.001	8.0	4.0	16.2	
51.2 (1), <0.001	80.4	.154	History of suicide attempt	Borderline	2.4	36.9, <0.001	11.0	5.1	24.0	
20.2 (1), <0.001	79.2	.055	Self-confidence	Perseverance	-1.0	10.2, 0.001	0.36	0.19	0.67	
16.8 (1), <0.001	81.5	.043	Life is satisfactory	Depression	-1.3	14.4, <0.001	0.29	0.15	0.55	
9.3 (1), 0.0002	82.7	.023	I cannot stop bad habits	Perseverance	0.96	9.2, 0.002	2.6	1.4	4.8	

TABLE 8.										
Final Model Logistic Regression Results for Significant Independent Variables with Having Suicide Plan as the Dependent Variable for Acute and Chronic Pain Patients										
Step $\chi^2$ (df), p value	% of Cases Predicted Correctly by the Model	Step Nagelkerke R <sup>2</sup>	Variable	Associated BHI-2 Scale	B	Wald, p value	Odds Ratio	Lower 95% CI for Odds Ratio	Upper 95% CI for Odds Ratio	
<b>ACUTE PAIN PATIENTS</b>										
39.1 (1), <0.001	93.9	.283	Recent frequent suicide ideation	Depression	2.3	12.0, 0.001	10.3	2.7	38.4	
23.7 (1), <0.001	94.5	.156	Having many violent thoughts	Hostility	2.3	15.5, <0.001	10.5	3.2	33.7	
13.3 (1), 0.001	94.5	.082	Feeling empty and dead inside	Depression	2.2	11.6, 0.001	8.8	2.5	30.9	
7.3 (1), 0.007	95.4	.044	Worst enemies are former friends	Borderline	1.6	7.2, 0.007	4.9	1.5	15.8	
<b>CHRONIC PAIN PATIENTS</b>										
36.1 (1), <0.001	90.7	.295	Recent frequent suicide ideation	Depression	2.3	13.1, <0.001	10.2	2.9	36.0	
12.5 (1), <0.001	91.1	.091	Hearing voices that others don't	Somatic Complaints	2.9	11.9, 0.001	18.3	3.5	95.4	
11.5 (1), 0.001	92.4	.080	History of suicide attempt	Borderline	1.9	10.3, 0.001	6.6	2.1	20.9	
5.4 (1), 0.02	92.4	.037	Employment status	Not applicable	-1.7	4.0, 0.045	0.18	0.03	0.96	