

# The Risk of Suicide Mortality in Chronic Pain Patients

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**Abstract** Chronic pain has long been considered an important risk factor for suicidal behavior. Less well understood are the factors associated with the increased risk for suicide death within chronic pain populations. The purpose of this review is to examine recent research with regard to rates of and risk factors for suicide mortality in patients with chronic musculoskeletal pain. We conclude that patients with a number of chronic pain states are at increased risk for suicide death, and that this risk appears to be due, at least in part, to other well-known correlates of pain such as depression and substance use disorders. However, in all likelihood, there are aspects of chronic pain itself that add uniquely to an individual's suicide risk profile. Lastly, we address a theoretical perspective and offer recommendations for clinical practice.

**Keywords** Chronic pain · Suicide · Depression · Anxiety · Risk factors

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## Introduction

In 2010, over 38,000 suicide deaths occurred in the United States, and for every suicide death there are estimated to have been 25 suicide attempts [1]. Decades of research focused on elucidating potential causes of suicide suggest that chronic pain is an important risk factor for suicidal ideation, plans, and attempts [2, 3]. More so than acute pain, the presence of chronic pain appears to confer an increased risk for suicidal behavior. For example, patients with chronic pain have been found to be five times more likely to express a desire to die compared to patients with acute pain [4]. Although a review by Tang and Crane found that risk of death by suicide is at least double in those with chronic pain [5], the relationship between chronic pain and suicide mortality is not well understood. A series of recent studies may serve to clarify this association and provide insight, thus facilitating timely intervention.

Chronic pain is remarkably common, affecting an estimated 100 million Americans [6]. While life-threatening diseases such as cancer frequently result in chronic pain and are associated with an increased risk for suicide [7], musculoskeletal pain conditions like chronic low back pain and fibromyalgia, and widespread pain more broadly, are also associated with an increased risk [5, 8•, 9–13, 14•, 15]. These latter conditions are the primary focus of this review, as suicidal ideation has been found to be present in approximately 20 % of these patients [5]. While not directly life-threatening, as may be the case in chronic pain caused by cancer and other diseases, these pain disorders can lead to dramatic changes in quality of life, often resulting in psychiatric comorbidity and increased risk for suicide [16]. What is less clear, however, is the independent risk conferred by chronic pain above and beyond the presence of psychiatric comorbidity. Moreover, there are likely a number of risk factors for suicide within the chronic pain population itself, such as the presence of more severe

pain [2, 4, 9, 13] and psychiatric comorbidity [14••, 15] and it is of key importance to understand which patients with chronic pain may be at elevated risk for suicide. The purpose of this review is to examine recent research with regard to rates of and risk factors for suicide mortality in patients with chronic musculoskeletal pain. A theoretical perspective and clinical implications will also be discussed.

### Chronic Pain and Suicide Mortality

Much of what is known about chronic pain and suicide mortality comes from a series of studies conducted over the last five years. In these studies, the rates of and specific risk factors associated with suicide mortality in chronic pain populations are elucidated. Moreover, evidence is emerging that supports an independent contribution of pain severity outside of other predictive factors such as medical and psychiatric comorbidities. Kikuchi and colleagues assessed the risk for suicide in 21,083 Japanese men and found that greater pain severity remained significantly associated with suicide mortality even after controlling for many key covariates such as demographic factors, health status, physical functioning, medical comorbidities, sleep duration, alcohol consumption, body mass index, smoking, and psychological stress [13].

Although the Kikuchi et al. study did not include psychiatric comorbidity as a key covariate, a study conducted by Ilgen and colleagues did account for psychiatric factors in the context of pain and suicide mortality [2]. In their study of 260,254 veterans, the authors found a dose-response relationship between pain severity and completed suicide. For example, the suicide rate for veterans with very mild pain was 45.27 in 100,000 person-years, in contrast to a rate of 80.65 in veterans with very severe pain. When dichotomizing the patients into groups characterized as having moderate or less pain versus severe or very severe pain, the latter group was much more likely to commit suicide, even after controlling for demographic factors and psychiatric characteristics (HR = 1.39,  $p < 0.0001$ ; CI 1.21–1.58).

Other studies have examined the impact of specific pain conditions on suicide risk. For instance, two separate studies evaluated patients with fibromyalgia. In the first study, Dreyer and colleagues conducted a 15-year prospective cohort study of 1,269 Danish patients with fibromyalgia or suspected fibromyalgia [8••]. They found that although these women were not at increased risk for all-cause mortality compared to the general population, they were at increased risk of death from suicide, with a standardized mortality rate (SMR) of 10.5 (95 % CI; 5.5–20.7). Counter to what might be expected, women with suspected fibromyalgia had a higher SMR than those with confirmed fibromyalgia (19.6 and 6.5, respectively). Interestingly, men had no increased risk for suicide in either fibromyalgia group [8••]. With regard to risk factors,

Dreyer et al. found that patients who died by suicide did not have a pre-existing psychiatric disorder at the time of fibromyalgia diagnosis. Since psychiatric comorbidity is prevalent in those who die by suicide [1], the absence of such conditions is an anomaly. It is possible that psychiatric conditions developed over time and later contributed to suicidal ideation and behaviors; psychological status at the time of suicide was not reported.

In another study assessing mortality in fibromyalgia, Wolfe and colleagues evaluated 8,186 patients with fibromyalgia who were seen at three different sites in the United States between 1974 and 2009 [9]. The authors reported that although patients with fibromyalgia were not at increased risk for mortality compared to a chronic pain control group (e.g., osteoarthritis), individuals with fibromyalgia were at least three times as likely (OR = 3.31) of dying from suicide compared to the general population. It was also noted that death from suicide in women with fibromyalgia occurred at a younger age ( $46.5 \pm 11.4$ ) compared to death from other causes ( $60.2 \pm 13.0$ ). The authors noted that patients with fibromyalgia were also at increased risk of death due to accidents (OR = 1.45, 95 % CI; 1.02–2.06), which led them to speculate that some of the deaths classified as accidents may have actually been suicides, and thus the rate of suicide may have been underestimated. Risk factors for all-cause mortality in the study included pain severity and currently meeting criteria for fibromyalgia.

In perhaps the largest study to date of suicide and non-cancer pain, Ilgen and colleagues evaluated associations between various clinical pain diagnoses and suicide among patients treated at Veterans Affairs (VA) facilities [14••]. Data for 4,863,086 patients were extracted from the Department of VA healthcare system and the National Death Index. Diagnoses considered included arthritis, back pain, migraine, neuropathy, headache/tension headache, fibromyalgia, and psychogenic pain (i.e., ICD-9-CM diagnoses 307.80 and 307.89). After controlling for age, sex, and medical comorbidity, the hazard ratios (HR) for suicide mortality were elevated for every pain condition except arthritis and neuropathy; however, when also controlling for comorbid psychiatric disorders (e.g., substance use, bipolar, depression, anxiety, PTSD, schizophrenia), the risk of suicide was significant for only three conditions, including back pain (HR = 1.13; 99 % CI; 1.03–1.24), migraine (HR = 1.34; 1.02–1.77), and psychogenic pain (HR = 1.58; 1.11–2.26). These findings suggest that there are likely important differences among the types of pain and associated suicide risk. More specifically, a musculoskeletal pain condition, back pain, was associated with increased risk for suicide even after considering the effects of psychiatric illnesses such as mood disorders, anxiety disorders, schizophrenia, and substance use disorders. The data underscore the need for greater awareness of the increased risk for suicide in patients with non-cancer pain, even when psychiatric

comorbidity is not observed. Such findings are strongly supportive of the possibility that chronic pain may have a unique contribution to a patient's suicide risk profile.

Löfman and colleagues explored the characteristics of suicide in patients with back pain [15]. In their population-based study, the hospital discharge records of individuals from northern Finland who had committed suicide were reviewed to specifically assess for the presence of back pain, including sciatica. Of the 2,310 suicides investigated, 490 individuals (21.3 %) were identified as having had 'hospital-treated' musculoskeletal pain. These patients tended to be older by 11 years than those without back pain who died by suicide. Nonviolent suicide methods, including overdose using analgesics, were more common in patients with back pain compared to those without. Men with back pain who died by suicide were also more likely to have been treated in the hospital for depression and/or substance use disorders, while women were more frequently under the influence of alcohol compared to the other groups.

Lastly, and in contrast, a 17-year follow-up study of 2,261 women living in Norway conducted by Nitter and Forseth reported that women with chronic pain at baseline were not at increased risk for suicide [17]. Rather, all of the women who died by suicide reported being anxious, frightened, or nervous when first evaluated upon study entry. With regard to differences between groups, 14 % of the deaths of women without chronic pain were attributable to suicide, compared to 9 % of those with chronic pain. This finding may be explained in part by the unusually high number of women who reported having chronic pain (57 %). It is possible that these findings may not be generalizable to other populations due to the assessment methodology or unique sample characteristics.

### Risk Factors for Suicide in Patients with Chronic Pain

In reviewing the latest findings regarding suicide and chronic pain in the context of the older literature, a number of risk factors for suicide mortality emerged, including pain characteristics, psychiatric comorbidity, other psychological factors, and substance abuse, along with ready access to analgesics [2, 12, 14•, 18–21]. Furthermore, suicide risk factors specific to chronic pain should be considered in addition to general risk factors such as family history of suicide, personal history of attempted suicide, feelings of isolation, experience of significant loss, history of childhood abuse, substance abuse, and access to lethal weapons/substances [5, 22].

#### Pain Characteristics

Multiple studies suggest that greater pain severity is a risk factor for increased suicidal mortality [2, 5, 9, 13], as is location of the pain or pain diagnosis [9, 14•, 15, 20]. For

example, previous and current studies suggest that back pain is associated with increased risk for suicide death, while neuropathic pain is not associated with such risk [14•, 20]. The data for fibromyalgia are more mixed, although the studies by Wolfe et al. and Dreyer et al. provide compelling evidence of significantly elevated risk for suicide mortality associated with fibromyalgia [8•, 9].

#### Psychiatric Comorbidity

Comorbid psychiatric conditions – in particular, depression, anxiety, and substance abuse – have also been implicated in increased suicide risk among patients who experience chronic pain [23]. In recent studies, for instance, Calandre et al. found that depression and anxiety were higher among women with fibromyalgia who had previously attempted suicide compared to those who had not, while Okifuji et al. reported that 31.0 % of chronic pain patients with anxiety experienced current suicidal ideation compared to 13.0 % of those without anxiety [24]. However, the presence of psychiatric comorbidity does not fully explain the increased risk for suicide death; pain appears to be an independent contributor [2, 14••].

Several studies have linked current or past substance abuse with increased risk of suicide in chronic pain, which has implications for the potential misuse of analgesics [18, 20, 23, 25, 26•]. In a population-based study conducted in Ontario, Canada, Madadi and colleagues found that among 215 suicide deaths, 111 (52 %) were related to opioids prescribed for chronic pain [18]. Similarly, in a review of analgesics and suicide, Pereira et al. reported that three studies evaluating antiepileptic drugs indicated an elevated risk of suicidality in patients with chronic pain who were using these medications [19]. As such, the use of screening tools to evaluate increased risk of medication abuse and suicidality would be a good precautionary step.

#### Other Psychological Factors

Tang and Crane listed a number of psychological risk factors other than psychiatric comorbidity to consider when evaluating patients with chronic pain, including poor sleep, desire for escape from pain, pain catastrophizing, avoidance, problem-solving deficits, hopelessness, and helplessness [5]. In a recent study evaluating predictors of suicidal ideation in 88 Canadian patients with chronic pain, Racine et al. assessed many of these factors, and found that the only cognitive predictor of suicidal ideation was pain-related helplessness [26•].

Lastly, perception of disability is another potentially important psychological factor to consider when evaluating suicide risk in chronic pain populations. In a study testing this premise, Fishbain and colleagues explored the possibility that suicidal behavior was associated with a preference for death over disability [27]. Comparisons were made between

community non-patients without pain (n=129), community patients with pain (n=108), patients with acute pain (n=326), and patients with chronic pain (n=341). They found that while there were no differences among groups for preference of death over disability, in patients with both acute and chronic pain, endorsing a preference for death over disability was associated with wanting to die because of pain, recent suicidal ideation, and having a suicide plan, among other suicide variables. Figure 1 depicts risk factors for suicide in general, along with those for chronic pain more specifically.

### Understanding Suicidal Behavior

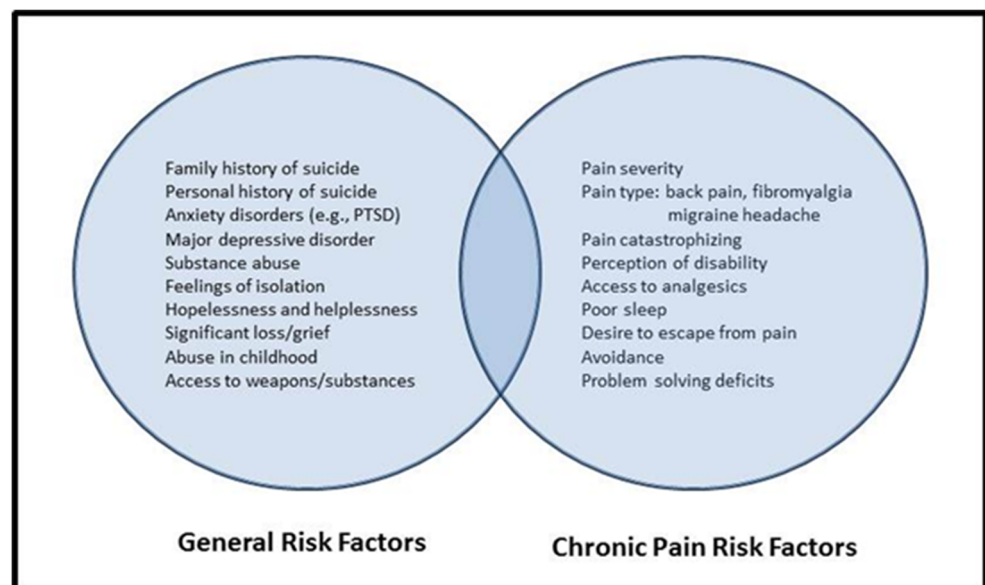
There has been increased interest in developing improved models for suicide risk among individuals with chronic pain, and much of this work has been guided by the interpersonal theory of suicide. This theory suggests that the psychological underpinnings of suicide involve feelings of hopelessness and perceived burdensomeness and thwarted belongingness, which results in the transition from passive to active suicidal ideation [28]. Individuals in whom these feelings are more transient are less prone to suicidal thoughts and behaviors than individuals who feel more hopeless about the future. An empirical evaluation of the interpersonal theory of suicide among chronic pain patients supported the basic tenets of the theory. Wilson and colleagues reported that both thwarted belongingness and perceived burdensomeness predicted suicidal ideation above and beyond demographic factors, pain severity, duration of pain, poor functioning, catastrophizing, and depression [29]. Suicide attempts were not evaluated in this study, and the authors' assessment might have captured

the level of acquired capability to attempt suicide. Nonetheless, they concluded that the interpersonal theory may explain elevated rates of suicidal behavior in patients with chronic pain. In a small retrospective study (n=113) of patients with chronic pain, Kanzler and colleagues assessed the relationship among depression, perceived burdensomeness, and suicide ideation, and found that perceived burdensomeness was the sole predictor of suicidal ideation, even after controlling for age, sex, depressive symptoms, and pain severity [30].

In another attempt to explain the association between pain and the acquired capability to actually engage in suicidal behavior, Franklin et al. conducted a study in a small sample of undergraduate students [31]. They found that pain tolerance – but not other pain variables such as threshold and intensity – was significantly associated with painful and provocative events and the acquired capability for suicide. The authors posited that the hyperalgesia experienced by patients with chronic pain may habituate them to pain and thus make them more susceptible to committing suicide.

A stress-diathesis model of suicidal behavior proposes that there is an interaction among the multitude of risk factors and predisposing biological mechanisms [32]. This theory is supported by a number of neuroimaging studies that have directly evaluated the neural correlates of suicidal behavior. Twenty-two of these studies were recently reviewed by van Heeringen et al. [33], who found that many of the areas that appeared to be involved in suicidal behavior (e.g., ventral and medial prefrontal cortex, orbitofrontal cortex, amygdala, insular cortex, dorsal anterior cingulate cortex) are part of the emotion-regulating circuitry in the brain [33]. The authors proposed that lesions in a specific structure and/or disrupted connectivity can result in malfunction in other areas, and such

**Fig. 1** Risk factors for suicide among chronic pain patients are unique, but also overlap with risk factors for the general population



abnormalities could trigger mood disorders and create biological vulnerability that, in combination with environmental factors, result in suicidal actions. Lastly, many of the areas associated with suicidal behaviors are the same as those implicated in the dysfunctional processing of pain [34–36].

### Clinical Implications

Taken together, these recent studies suggest that a number of strategies may be helpful in the prevention of suicidal behaviors in individuals with chronic pain. First, it is important that in settings where there is interaction with patients with chronic pain, such as pain treatment clinics, patients are regularly screened for suicidal thoughts, plans, and recent behaviors. It would be useful to conduct this screening at the first point of clinical contact, as well as to conduct periodic re-screening in higher-risk patients. Patients with higher risk are likely those with prior suicidal thoughts, plans, and behaviors and those with particularly high levels of pain, certain types of pain, such as fibromyalgia or back pain, and/or co-occurring psychopathology. Table 1 provides some useful questions to help explore patients' suicidal thoughts, plans, and behaviors, as well as potential actions that the clinician can consider.

A comprehensive assessment of these factors early in the treatment process may help to identify individuals for whom more intensive suicide risk monitoring over time may be appropriate. Suicide screening measures such as the Columbia Suicide Severity Rating Scale (CSSRS) [37] have been reliably used in a number of clinical settings, and could

**Table 1** Examples of questions to ask when assessing suicide risk, and several actions to consider, contingent upon level of risk

#### Questions

- Have you been feeling hopeless or helpless?
- Have you had thoughts about suicide?
- Do you have a plan as to how you would take your own life?
- Do you have access to ... (the means such as medications, weapons, illegal drugs, etc.)?
- Have you ever attempted suicide?

#### Actions

- Give the patient phone numbers to contact in case of emergency, including a crisis hotline.
- Discuss the patient's resources such as family members, friends, clergy, etc.
- Create a plan to address availability of means (e.g., medications, weapons, illegal drugs).
- Assess the need for referral for psychiatric care.
- Have the patient hospitalized if necessary.

be utilized to monitor pain patients for periods of increased suicide risk. It is important, however, to take into consideration that such measures can result in false positives or negatives and that they are also limited by the transient nature of suicidal thoughts and behaviors – changing circumstances are not well-captured by any single measure.

Once individuals are identified as high-risk, treatment providers should consider referring these patients for more intensive treatment. In practice, these treatments often address the co-occurring psychiatric disorder such as depression or substance abuse. In addition, a few psychosocial treatments, such as cognitive behavioral treatment and dialectical behavior therapy, have been found to have direct effects on suicidal behaviors [38, 39]. For patients with chronic pain, these interventions might specifically focus on addressing feelings of burdensomeness, hopelessness, and/or catastrophic beliefs about the implications of pain. Although the specific type and focus of treatment will vary from patient to patient, clinicians who interact with pain patients can help connect at-risk patients to mental health providers and can encourage patients to be open in their discussions of how living with chronic pain has influenced their will to live and their thoughts about the future.

It is worth noting that there is no reason for clinicians to fear working with chronic pain patients out of concern that these patients are at imminent risk of dying by suicide. To provide some context, during the course of the Nitter and Forseth study, eight of 2,261 patients committed suicide, which translates to a rate of suicide death of 0.35 % for the 17-year period [17]. Similarly, in the Wolfe et al. study, even fewer pain patients – 15 of 8,186 patients followed over 35 years – died by suicide, for a population rate of 0.18 % [9]. It is important, however, for clinicians to acknowledge the increased risk and to take steps to accurately measure and manage suicidal thoughts and behaviors in patients with chronic pain. In most cases, this can be done successfully and can result in a significant improvement in patients' quality of life.

### Conclusions

A significant and growing body of literature indicates that chronic pain is associated with increased risk for suicide. While this appears to be due, in part, to various other well-known correlates of pain such as depression and substance use disorders, there is increasing evidence that chronic pain likely adds uniquely to an individual's suicide risk profile. In general, clinicians who work with pain patients should be aware of the association between pain and suicide risk and should integrate suicide risk assessment and management into their clinical programs. This increased vigilance and responsiveness may help to lower the risk for suicidal behaviors among patients with chronic pain.

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### Compliance with Ethics Guidelines

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- Of importance
- Of major importance

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