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Predictors of Prescription Opioid Use 4 Months After Traumatic Musculoskeletal Injury and Corrective Surgery: A Prospective Study

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Abstract: **The aim of the present study was to examine the incidence and predictors of persistent prescription opioid use 4 months after traumatic injury. Adults who sustained a traumatic musculoskeletal injury were recruited to participate in this observational prospective, longitudinal study within 14 days of injury (T1) and followed for 4 months (T2). Measures included questionnaires on pain, opioid consumption, pain disability, anxiety, depression, and posttraumatic stress symptoms as well as a chart review for injury related information. The sample consisted of 122 patients (66.4% male; mean age = 44.8 years, SD = 17.1), of whom 94.3% (n = 115) were using prescription opioids. At T2, 35.3% (n = 43) patients were using prescription opioids. After controlling for age, sex, injury severity, T1 pain severity, and T2 symptoms of depression, 2 factors emerged as significantly related to T2 prescription opioid use; namely, T2 pain severity (odds ratio = 1.248, 95% confidence interval, 1.071–1.742) and T2 pain self-efficacy (odds ratio = .943, 95% confidence interval, .903–.984). These results suggest that opioid use after traumatic musculoskeletal injury is related to pain severity and how well patients cope specifically with their pain, over and above other psychological factors, such as depression and anxiety.**

Perspective: ***This article identifies predictive factors for prescription opioid use after traumatic musculoskeletal injury, namely severe pain and a poor sense of control over the pain. These results highlight the importance of using prospective longitudinal study designs to understand why patients continue to use prescription opioids after major tissue-damaging events.***

Key words: *Traumatic injury, surgery, opioids, pain, depression, anxiety.*

Musculoskeletal trauma is associated with pain, disability, anxiety, depression, and posttraumatic stress.[28,30,31] Although acute pain is expected after traumatic injury requiring surgery, up to 90% of patients develop chronic pain that is moderate to severe in intensity and associated with considerable disability in approximately 30%.[30,31]

Patients who have sustained traumatic injury are also at a higher risk, than the general population, of using and abusing psychoactive substances, such as opioids.[32] Opioids are commonly used to treat acute pain after injury-related surgery; however, they are not without major risks, including addiction and death, especially with persistent use.[1] The rates of persistent opioid use among adult surgical patients range from .1 to 3%, depending on the type of surgery.[8,34] For example, higher opioid usage is seen in patients undergoing thoracic surgery[8] or total knee arthroplasty[34] 3 months or more after surgery. Further, without statistically controlling for chronic

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postoperative pain, large retrospective studies of surgical patients have identified certain risk factors for persistent opioid use, such as male sex, older age, having a history of drug or alcohol abuse, and taking medications for anxiety or depression.[8,34]

Rates of prescription opioid use among trauma surgery patients may be as high as 28% 2 months after injury.[11,13] Because opioids are prescribed for pain relief, it is logical to assume that pain severity would predict persistent opioid use. Other factors associated with their prolonged use appear similar to that in surgical patients (eg, pain catastrophizing and symptoms of depression, posttraumatic stress, and anxiety[11]). However, because of cross-sectional study designs,[11] retrospective database analysis,[8,34] or failure to control for pain severity,[11] it is not clear the extent to which severity of acute postsurgical pain or the presence of chronic pain is associated with persistent opioid use.

The primary aim of the present prospective, longitudinal study was to conduct a secondary data analysis to examine the incidence and predictors of persistent prescription opioid use 4 months after traumatic musculoskeletal injury. It was hypothesized that pain severity measured while in hospital within 2 weeks of injury would predict the use of prescription opioids 4 months after hospital discharge after controlling for relevant demographic- and injury-related variables. We were also interested in determining 1) whether factors associated with psychological distress, pain-related as well as general, would predict the use of persistent opioid use over and above pain severity, and 2) how the predictors of persistent opioid use change over time.

Methods

Research ethics board approval for this study was obtained from Sunnybrook Health Sciences Centre, St. Michael's Hospital, and the University of Toronto in Toronto, Canada. Detailed methods for this study are described elsewhere.[30]

Procedures

Patients were recruited to participate from 2 large level I trauma centers. Eligible participants included patients who could speak and write in English, 18 years or older who sustained a traumatic musculoskeletal injury, and underwent a corrective surgery, and were admitted to hospital for 2 or more days. Patients were excluded if they had documentation of a traumatic brain injury, spinal cord damage, burns, or self-inflicted injuries; or had sustained an isolated fracture from standing.

Patients who agreed to participate completed 2 assessments: the first within 14 days of injury, while the patients were still in hospital (T1); and, the second 4 months postinjury (T2). At T2, patients completed the assessment using pen and paper or an online survey platform (Survey Monkey).

Measures

Demographic and Medical Information

Demographic information (age; sex; race; annual income; education; presence of current or past psychiatric diagnoses including depression and anxiety; any current treatment for pain, depression, or anxiety; preinjury chronic pain conditions; and, perceived preinjury health, and frequency of alcohol and drug consumption) was collected at T1. Information was collected from medical charts on mechanism of injury, Injury Severity Score (ISS),[4,15] injury characteristics, surgical interventions, pain management, and length of stay.

Validated Measures

Patients completed the following questionnaires:

The Brief Pain Inventory [BPI]-Short Form measures pain severity (ie, the Pain Severity Subscale [PSS] that averages pain within the previous week at its worst, best, and on average), pain location, pain interference (ie, the Pain Interference Subscale that averages how much pain interferes with mood, general activity, walking, normal work, relations with other people, sleep, and enjoyment of life), and pain management (pain medications, physiotherapy, acupuncture, psychotherapy, or other treatments), and the percentage of pain relief obtained from these treatments.[9,20] The pain management question was modified for the purposes of this study to include examples of pain medications, specifically opioids that patients might be using 4 months after injury (eg, oxycodone, oxycodone and acetaminophen). Opioid use at 4 months was defined according to patient report as having taken opioids in the past week. The Self-Report Leeds Assessment of Neuropathic Symptoms and Signs measures the presence of neuropathic pain and nociceptive pain.[5,38] The Hospital Anxiety and Depression Scale (HADS) measures symptoms of depression and anxiety with established cutoff scores to determine the presence of significant symptoms.[6,12,41] The Pain Anxiety Symptoms Scale assesses 4 components of fear and anxiety responses to pain (cognitive, fear, escape/avoidance, and physiological[22]). The Posttraumatic Stress Disorder Checklist-Civilian Version measures symptoms for posttraumatic stress disorder on the basis of the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition.[37] A conservative cutoff score of 44 was used to identify patients with severe posttraumatic stress disorder symptoms. The Pain Self-Efficacy Questionnaire measures patient's confidence in completing activities of daily living despite pain.[24,25] The Pain Catastrophizing Scale assesses catastrophic thinking in relation to pain. When completing the questionnaire patients are asked to reflect on past painful experiences and indicate to what degree they experiences each of the 13 items when experiencing pain to provide a total score and 3 subscales that assess rumination, magnification, and helplessness.[33] The Anxiety Sensitivity Index-3 measures anxiety sensitivity or the fear of arousal-related sensations that come from the fear that these sensations will have adverse consequences.[27,35] Sensitivity to Pain Traumatization Scale (SPTS) assesses sensitivity to pain traumatization, which is