



Narrative Review

Psychological Distress After Orthopedic Trauma: Prevalence in Patients and Implications for Rehabilitation

Heather K. Vincent, PhD, FACSM, MaryBeth Horodyski, EdD, LAT, FNATA,
Kevin R. Vincent, MD, PhD, FACSM, Sonya T. Brisbane, MS, Kalia K. Sadasivan, MD

Abstract

Orthopedic trauma is an unforeseen life-changing event. Serious injuries include multiple fractures and amputation. Physical rehabilitation has traditionally focused on addressing functional deficits after traumatic injury, but important psychological factors also can dramatically affect acute and long-term recovery. This review presents the effects of orthopedic trauma on psychological distress, potential interventions for distress reduction after trauma, and implications for participation in rehabilitation. Survivors commonly experience post-traumatic stress syndrome, depression, and anxiety, all of which interfere with functional gains and quality of life. More than 50% of survivors have psychological distress that can last decades after the physical injury has been treated. Early identification of patients with distress can help care teams provide the resources and support to offset the distress. Several options that help trauma patients navigate their short-term recovery include holistic approaches, pastoral care, coping skills, mindfulness, peer visitation, and educational resources. The long-term physical and mental health of the trauma survivor can be enhanced by strategies that connect the survivor to a network of people with similar experiences or injuries, facilitate support groups, and social support networking (The Trauma Survivors Network). Rehabilitation specialists can help optimize patient outcomes and quality of life by participating in and advocating these strategies.

Introduction

Orthopedic trauma is a life-changing event [1] that can result in multiple fractures and limb amputations. Nearly 2.8 million people sustain orthopedic injuries annually [2]. Trauma is treated by surgeons and medical specialists who focus on medically stabilizing and “reconstructing” the patient. Once these patients complete their hospital stay for their injuries, they are discharged to begin reintegration back into their home and community. Despite the high level of surgical success and excellent survivorship rates, these survivable injuries often result in poor quality of life (QOL) outcomes in otherwise healthy people [3].

Trauma survivors have high levels of depression and anxiety [4,5], emotional strain [5], and functional impairment [6] over the long term [7]. Patients must cope with physical disability, financial hardships [8], persistent pain [9], social isolation, and strain on personal relationships [10]. These difficulties contribute to a protracted or complicated recovery over years and a

poor QOL [10,11]. Depression, anxiety, and post-traumatic stress are among the predictors of poor long-term QOL and reliance on pain medication [7,12]. Negative outlook affects the ability to return to work, perception of physical recovery [13], and personal fulfillment [11]. Overwhelming suffering from trauma evokes strong emotions that shape the trajectory of the recovery process [14]. A person’s psychological disposition after an orthopedic trauma injury may accurately predict the recovery response and the likelihood of persistent physical disability [13,15,16], chronic pain [16], and diminished quality of well-being [7].

Although the main focus in rehabilitation has traditionally been on correcting functional deficits in the recovering patient, it is critical for rehabilitation specialists to be knowledgeable about the psychological factors that affect postinjury short- and long-term functioning [17]. This review presents the effects of orthopedic trauma on psychological distress, potential interventions for distress reduction after trauma, and implications for participation in rehabilitation.

Methods

This article is a narrative review of the major types of psychological distress that occur after orthopedic trauma. The prevalence of distress, methods to identify patients at risk for distress, and the implications for participation in rehabilitation are presented. A PubMed literature search was conducted to find articles in English with the key words "orthopaedic trauma," "distress," "anxiety," "depression," "post-traumatic stress syndrome," "PTSD," "quality of life," and "physical function." To supplement the information necessary to capture patient experiences with traumatic injuries, the terms "motor vehicle accident," "amputation," "war-related injuries," "motorcycle," "falls," and "gunshot" were used. A total of 845 articles were identified, and all abstracts were screened for relevance to the topic. An additional search of relevant articles was performed using the reference lists for each article. Articles were considered relevant if they contained a population who experienced orthopedic trauma injury and if distress was measured during acute care and at follow-up. Additional articles were included to demonstrate possible methods of helping patients navigate the rehabilitation process (eg, emotional support, support groups, pastoral care, and Trauma Support Network). A total of 84 articles were included in this narrative review. Using the Levels of Evidence for Prognostic Studies schema, the articles discussed in the psychological stress subsections and potential treatments were categorized. The distribution of articles with evidence at levels I-V were as follows: 22%, level I; 66%, level II; 9%, level III; and 6%, level IV.

Orthopedic Trauma, Distress, and Psychological Outcomes

Psychological distress is a general term that describes the negative emotional state that affects level of functioning, self-actualization, and connecting with others. Distress can be manifested as sadness, depression, anxiety, irritability, or dissatisfaction with life. Psychological variables may influence rehabilitation outcomes in several ways [18]. First, depression can reduce patient motivation to fully engage in rehabilitation activities. Second, post-traumatic stress and fear of reinjury may cause activity avoidance that prevents patients from practicing their physical activities. Third, persistent pain symptoms may trigger anxiety and negative thinking, which may ultimately contribute to physical limitations. Figure 1 proposes possible interrelationships between orthopedic injury, mental distress, and the relationships with additional negative mood states and functional impairment. Distress occurs at the time of the injury or perioperatively. During the rehabilitation process, additional distress may occur

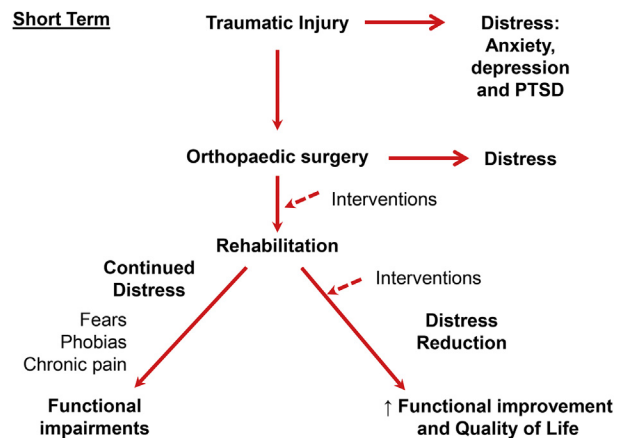


Figure 1. Relationships between orthopedic trauma injury, mental distress, rehabilitation, and outcomes. Interventions (eg, counseling, pastoral care, social support, mindfulness and meditation, and Trauma Support Network tools) can be applied to different phases of recovery to reduce the risk of functional impairment and poor quality of life. PTSD = post-traumatic stress disorder.

with pain flares and physical discomforts, with acknowledgment of injury severity, and with realization of physical limitations. If left untreated, continued mental distress contributes to the development of negative emotions, fears, phobias, pain, and chronic physical impairments.

The impact of psychological distress after traumatic musculoskeletal injury is both personal and societal. High levels of distress are related to a greater comorbid burden [19]. Furthermore, lingering psychological distress contributes to the development of other health problems (eg, inflammatory diseases) [20,21], and rebuilding of life is negatively affected [22]. A lack of psychosocial support contributes to injury recurrence, injury recidivism, rehospitalizations and longer hospitalization stays, and higher societal health care costs [23]. Although a number of psychological factors can affect rehabilitation and long-term outcomes, 3 key psychological conditions, including post-traumatic stress disorder (PTSD), depression, and anxiety, are presented here.

PTSD

The acute normal response to a life-threatening situation is for the body to protect itself from harm. PTSD is the overreaction of this response wherein people feel frightened and distressed even when the danger is gone [24]. This condition can last for months or years after the traumatic event occurs. PTSD leads to increased somatic complaints and return visits to the physician [25]. Common traumatic events that trigger PTSD include motor vehicle accidents, falls, assaults by gun or knife, work-related machinery accidents, and sports-related and crush injuries [26,27]. PTSD can develop in both adult [7] and pediatric [28] patients. This

condition has been reported in patients from diverse locations in American [13], African [29,30], Australian [16], Asian [31-33], and European [34-36] countries. Overall, 20%-51% of patients with traumatic musculoskeletal injuries experience PTSD [13]. Younger people and women are more likely to experience this condition compared with men [29,30]. In one study, Nigerian women have been shown to respond to stress differently and have greater negative self-schema (an organization of the life experience) than do men [29]. The time course of PTSD symptoms can vary depending on the individual. deRoos-Cassini et al [26] found that even in the hospital during acute care, some patients have 60% higher PTSD scores compared with low-scoring patients. One to 6 months after discharge, some patients have worsening scores, others improve, and others remain the same, with chronic PTSD developing in persons who initially were high scorers. Additional evidence linking orthopedic trauma and PTSD is presented next.

Several large cross-sectional and prospective cohort studies have surveyed the prevalence of PTSD among adult and pediatric patients treated in trauma centers [15,36,37]. First, Starr et al [38] assessed the prevalence of psychological distress among 617 patients 1 year after their injury. More than half (51%) met the criteria for PTSD. Interestingly, patients indicated that the emotional problems caused by the injury were more difficult to cope with than the physical problems [38]. Second, 48% of trauma patients enrolled from 8 level I trauma centers (N = 569) were assessed for PTSD at 3, 6, 12, and 24 months [15]. At month 3, 42% of the patients experienced psychological distress after the traumatic injury, but only 6% of those patients reported improvement in this stress by month 24. Moreover, only 22% of patients reported receiving psychological services of any kind to help ameliorate their PTSD. Third, 1781 patients from the Dutch Injury Surveillance System were surveyed at 2 months and 2 years after traumatic injury regarding post-traumatic stress and health-related QOL [36]. Patients with initially high PTSD scores had the highest scores by 2 years. Patients with high stress reported greater difficulty performing mobility tasks, activities of daily living, and self-care compared with patients with low stress [36]. Fourth, American children aged 12-19 years who received care in a regionalized trauma care system were assessed for acute stress disorders (PTSD) and QOL (N = 401) [39]. Patients reported that a lack of control of the situation leading up to the traumatic event and/or death of a family member at the scene were key factors that induced PTSD while in acute care. Follow-up time points were months 3, 6, 12, 18, and 24. Older adolescents had twice the rate of PTSD compared with younger adolescents, and PTSD was nearly twice as likely to develop in girls as in boys. Injured adolescents were

up to 2.9 times as likely to have physical problems and lose interest in participating in usual activities [39]. Children with PTSD had an odds risk of developing depression and suicidal thoughts that ranged from 5.6 to 5.8. Finally, Norwegian patients with severe multiple trauma were prospectively followed up from the time of hospital admission to 2 years later [40]. A total of 34% of all patients were classified as having PTSD symptoms by year 2. The affected patients struggled with fulfilling their physical roles at home and in the community [40]. Thus a widespread prevalence of PTSD exists in the general orthopedic trauma population, and PTSD can interfere with normal physical functioning.

PTSD can persist in adults and children [39] long after the physical injuries have healed. In a Norwegian cohort of patients recovering from orthopedic trauma, overall mental health scores were a standard deviation below the healthy population norms [17]. Almost one third of these patients had a diagnosis of PTSD, and this distress was still present 2 years after the injury. In other studies, PTSD has been shown to linger between 2 [36,39] to 53 years [41]. Although mental distress can occur with life-threatening injuries [19], PTSD also occurs even when only one smaller body part is injured, such as the hand [27]. Patients with isolated hand injuries, PTSD, and depression have lower self-reported general health status and QOL compared with counterparts who do not have psychological issues [27].

Amputations can occur with blunt force or blast trauma. Military personnel are at high risk for this type of trauma. It is important to acknowledge that military personnel are exposed to multiple stimuli before, during, or after the traumatic injury that can cause psychological distress, which makes interpretation of the time course of PTSD onset and severity more challenging. However, one comparison studied injured soldiers matched by rank, military role, and length of service who took part in the same combat situations and were not injured [42]. The injured soldiers had a higher prevalence and severity of PTSD than did noninjured soldiers [42]. Among the general soldier population, the prevalence of PTSD is 14.8%-26.8% for unilateral lower limb amputation and limb salvage, respectively, at approximately 3 years after injury [43]. Among these patients, the prevalence of PTSD in bilateral lower limb amputation and salvage was 10.3% and 12.5%, respectively [43]. Although there may be an initial subset of amputees who need psychiatry services and support, this subset grows over time. Copuroglu et al [44] reported that during the early post-trauma period (from discharge to month 6), 36.3% of patients with amputations sought help for PTSD. By year 5, this percentage had increased to 77.2% [44]. Similarly, a high prevalence of soldiers who had sustained war-related orthopedic injuries experienced late and long-term PTSD symptoms during the 17-year follow-up [45]. In

another study, a large cohort of male amputees was contacted an average of 5 decades after their traumatic amputation while in the service (81.6% lower limb, 16.5% upper limb) to determine the presence and level of affective distress [41]. A total of 24.6% of the men had PTSD. Therefore, stress can develop after different injuries and may be influenced by other factors in warfare than injury alone. For many of these victims, the distress is long lasting.

Analysis of the Literature

The evidence regarding the prevalence of PTSD after orthopedic trauma is strong, but several areas warrant additional study. Of particular importance is prospective analysis of factors that predict trajectories of recovery: complete psychological recovery, onset of PTSD symptoms, and fulminant PTSD. Determination of factors that are related to acute and delayed PTSD onset is also important. This collective information could (1) advance acute care and postacute care psychosocial support protocol content and implementation and (2) be used to minimize the risk of a difficult adjustment to life after discharge by keeping patients on a "realistic" time frame and resources needed for recovery. Research in these areas must be done in geographically different parts of the world to account for variations in resource availability, social and vocational roles, and cultural considerations of the patient. A large gap in the evidence revolved around the long-term consequences of PTSD in children with musculoskeletal trauma. Finally, critical analysis of the differences in patients who do and do not participate in studies (eg, more amputees participate than do persons whose limbs are salvaged) would provide essential insight about the psychological status of this lost segment of the population.

Depression

Depression is a medical condition characterized by sadness, low mental concentration, sleep and eating disturbances, excessive guilt, and, sometimes, thoughts of suicide [46]. Depression is one of the most common comorbidities with PTSD [26,35,43], and some of the external patient symptoms can overlap. These 2 psychological conditions may be linked by several mechanisms. First, people who have experienced traumas are more likely to be depressed. Second, the symptoms of PTSD are often severe and debilitating, which initiates the onset of depression [35,47]. As such, depression and PTSD occur independently after trauma but have similar prognoses, and both interact to increase distress levels [47] and functional impairment. The World Health Organization indicates that depressive disorders is the leading cause of disability in people aged 15 to 44 years [48]. Children are at risk for underdiagnoses of depression after traumatic fractures. Depression rates range

from 7%-41% in children, and this range is much higher than that in the healthy, comparative population of children (4.35%-9%) [48]. Moderate to severe depression is a predictor of poorer performance with self-care tasks, mobility, and activities of daily living by hospital discharge [49] and long-term functional outcomes such as independent mobility [50]. The available evidence of the presence of depression in the orthopedic trauma population is described in the following sections.

In orthopedic trauma patients, the prevalence of depression is high, even right after the injury [4]. Crichlow et al [51] studied the relationships between the trauma injury severity and levels of depression in 116 patients. Injury severity was directly correlated with depression scores. Also, a strong inverse relationship existed between musculoskeletal function and depression score ($r = -0.75$). A total of 55% of patients reported minimal depression, whereas 28% and 13% experienced moderate to severe depression, respectively. Patients with open fractures were 4.6 times more likely to experience depression than were patients with closed fractures [51].

Prevalence of depressive symptoms in different trauma populations may be related to the injury type. For example, among patients with mandibular fracture, there is a high prevalence of depression in young, unemployed, male members of minority groups with pre-existing pain issues [52]. In contrast, a higher prevalence of postmenopausal women experience depression after a fall-related hip fracture and orthopedic surgery than do other patient subgroups [53]. It is possible that mental distress may be relative to the impact of injury type for a specific population. For example, facial fractures may dramatically affect younger people's ability to cope with disfigurement and social stigmas, whereas lower extremity trauma in older people in different stages of their lives can affect their ability to live independently and perform self-care activities. Irrespective of age or injury type, it appears that people with severe injuries who were depressed were less able to walk independently, ascend and descend stairs, rise from a chair, and move more quickly compared with people who were not depressed [15]. In military personnel with lower extremity injuries (single and bilateral amputations or single or bilateral limb salvage), depressive symptoms were more prevalent after salvage procedures compared with amputation (43.6% versus 37.5%) [43]. Interestingly, the amputees reported better physical function than did the patients with salvage procedures and had a 2.6 times greater probability of engaging in vigorous physical and sport activities. Depressive symptoms in injured military personnel could be related in part to the inability to participate in their active duties or vigorous sports.

Depression also predicts the risk for subsequent injuries by 2 years after an initial injury. Specifically,

older depressed women who sustained a fall-related hip fracture are more likely to fall and sustain a fracture again by 2 years [53]. Age may exacerbate the effects of depression on mobility outcomes. Adults older than 65 years with lower extremity amputation and a history of depression were 39% less likely to achieve success on the locomotor capability index (LCI-5) by 1 year compared with persons without depression [54].

Depression can linger for long periods. Among patients who were admitted to level I trauma centers for severe lower limb injury, 58.0% screened positively for moderate to severe depression, and 56.6% of these patients were still depressed 2 years after the injury [15]. Symptoms may emerge 3 months [26] out to 2 years after the injury [16]. Monitoring for depression should continue long after the injury to identify any patients who may be starting to experience mental distress.

Analysis of the Literature

The available evidence strongly indicates that depression is a common issue for patients with orthopedic trauma. Future studies need to determine the effect of pre-existing depressive symptoms or use of depression medications on the disease trajectory after a traumatic injury. Prospective, comparative studies could examine whether baseline personality characteristics and comorbid psychological illness may influence the likelihood of developing depression over time. It is not clear if there is an age-related effect on depression severity and longevity in this population, and additional research could clarify whether particular groups along the age spectrum are at higher risk for the onset of depression. It is possible that older patients have lower expectations for improvement compared with younger patients and thus are not disappointed with their QOL after injury, resulting in a lower incidence of depression [55]. Large prospective studies of a variety of different orthopedic injuries could clarify how depression symptoms may be related to the location of the injury (peripheral or axial). Identification of the injuries with the highest predictive value for depression would be very valuable in the care of and discharge plans for patients. Importantly, determination of the effects of postacute care type and location could shed light on how the trajectory of depression may be changed based on the rehabilitation resources provided.

Anxiety

Anxiety is defined as the state of mental uneasiness that induces physical and mental discomfort. Anxiety can be separated into 2 distinct dimensions: trait anxiety and state anxiety [56]. Trait anxiety refers to the part of anxiety that is characteristic within an individual and is related to personality. Each person is

characterized by his or her own anxiety level. State anxiety is the state of heightened emotions that occur during dangerous or fearful situations, such as trauma. Anxiety develops after numerous types of orthopedic trauma [13,15,16,57], sports-related injury [58,59], and falls [60]. As with depression, anxiety severity may be related to a specific population or activity. For example, lower limb amputees have indicated that they feel anxious because of the fear of losing balance and falling [61]. Anxiety is typically measured in conjunction with other psychological stressors such as depression, PTSD, and pain and not as a single characteristic.

Anxiety is elevated in trauma cohorts of all ethnic backgrounds. Among severely injured Dutch patients who were contacted 15-53 months after an injury, the prevalence of anxiety was 14% [5]. Patients affected by this stress reported significantly lower health-related QOL scores than did counterparts with no mental distress in the domains of physical health, social relations, and environment domains. Among a cohort of 200 Brazilian orthopedic trauma patients, 44% experienced anxiety while in the hospital setting [62]. In Chinese patients who sustained trauma as a result of a car accident, sport injury, industrial accident, or fall, State Trait Anxiety levels were elevated on the day before the surgery [63]. Although all patients in this group experienced improved anxiety levels during recovery, those who received an education intervention about pain, analgesic use, and self-efficacy showed a significantly faster reduction in anxiety after surgery compared with patients who did not receive this intervention.

Giannoudis et al [57] found that the presence of anxiety, as measured with the Euro Quality of Life questionnaire, was related to the severity of injury in the lower extremity [57]. Patients who underwent surgical treatment for open tibial fracture, open tibial fracture with vascular injury, and lower leg amputation reported higher anxiety levels than did those who underwent closed repairs and fasciotomies (45%-65% of the groups versus >10%-25% of the groups, respectively). Comparative patients admitted for other nontraumatic systemic issues had a prevalence of anxiety of 35% [62]. Overall, these data suggest that anxiety can develop rapidly after different orthopedic injuries and is mediated in part by injury exposure such as open or closed injuries.

Analysis of the Literature

Compared with other forms of psychological stress, anxiety is less researched and is often a secondary measure to PTSD or depression in this population. Lack of research on anxiety is a major gap in the literature, because pre-existing anxiety may modulate the onset or magnitude of postinjury stress. Among the trauma population, it is not yet known what specific factors

contribute to elevated anxiety or anxiety attacks after the physical injury has healed. Potential areas for future study of anxiety could include determining the role of self-perceptions of physical appearance (disfigurement or scarring), social isolation during recovery, inadequate support, change in overall health status, and vocational or social role changes on anxiety. Identification of the causes of anxiety is a critical next step to help develop interventions that reduce this stress. Large population studies of anxiety disorders among different orthopedic trauma types (eg, fracture, polytrauma, single or bilateral upper/lower extremity injury, spine trauma, amputation, or a combination of injuries) would provide essential information on the patient types at higher risk for this stress.

Implications for Rehabilitation and Potential Interventions in Acute and Postacute Care

Identification of patients with high levels of PTSD, depression, or anxiety early in acute care can help the medical team efficiently direct appropriate resources to the patient. Addressing distress quickly may help the patient fully engage in the rehabilitation activities for maximum benefit. Sample tools that can be used to identify whether patients may be at high risk for psychological stress are listed in [Table 1](#). These tools are easy to administer and are not a burden on the patient. All of the instruments (PTSD Checklist, Patient Health Questionnaire-9, Beck Depression Inventory [BDI], and Generalized Anxiety Disorder-7) can be administered to patients at any time during the acute care stay or after discharge.

The PTSD Checklist is a self-report measure that assesses the present level of PTSD after exposure to stress life experiences. The BDI is the most widely used tool to assess depression. The BDI is intended for people 13 years and older and consists of emotional, cognitive, and physical items that are related to depression. The Generalized Anxiety Disorder instrument consists of 7 items that are used to identify the presence and severity of anxiety. The State-Trait Anxiety Inventory is a self-report psychological inventory that is used to assess different types of anxiety. The Trait Anxiety Inventory is administered once to a patient to determine the baseline level of anxiety of the patient, but the State Anxiety Inventory can be performed at any time because it reflects the present state of anxiety and fluctuates based on life circumstances. All the self-report instruments identified in [Table 1](#) have been used in patients with orthopedic trauma and can be used for screening purposes, diagnosis, and tracking changes over time.

Once problems are identified, clinical psychologists, other appropriate health care personnel, and volunteers can be mobilized to provide support and resources specific to the patient needs. Interventions can

be administered during various phases of recovery, including after surgery, during rehabilitation, and after rehabilitation to reduce mental distress and optimize functional gains and QOL. Although the evidence relating to different interventions for the treatment of psychological distress after orthopedic trauma is very limited and diverse, valuable theoretical concepts exist that should be tested further with rigorous study. The following sections present the potential interventions that may reduce stress during acute care and after discharge in this population.

Counseling and Pastoral Care

Treatment of the patient with emotional support and counseling relating to personal and spiritual concerns is vital for full recovery. Sadly, 50% of patients who need psychological counseling or social support do not receive this care during their treatment for severe musculoskeletal injuries [55]. This lack of counseling and support is a serious problem for the patient, because untreated psychological stress contributes to enduring adversity in life [20] and an elevated likelihood of costly and damaging sequelae [22], including chronic pain [22] and comorbid disease [20]. Counseling and pastoral care may help offset the psychological stress after orthopedic trauma. In one small randomized, controlled study, counseling was provided twice a week for 45 minutes to older adults with a hip fracture who were on the orthopedic trauma service. The counseling intervention included the discussion of attitudes and perceptions about self. Compared with control subjects, the patients' anxiety and depression decreased by 16% and 66%, respectively, by 1 month of follow-up [60]. Pastoral care providers offer prayer or spiritual rituals for patients while they are on the trauma service, during rehabilitation, or after discharge [64]. In a small study of a mixed-method design (interview and survey), patients reported that the most valuable parts of pastoral care during inpatient rehabilitation for traumatic injury were being able to talk and to be heard, receiving reassurance when needed, seeing friendliness and interest from the provider, having a connection to the outside world, and receiving motivation for physical rehabilitation. The positive effects of pastoral care on PTSD symptoms and personal growth occurred in all patients, irrespective of faith and the number of visits provided [64]. Furthermore, even patients who did not normally engage in faith-based activities derived great benefit from the presence of the pastor during recovery.

Coping Skills for Persistent Pain

Lingering mental distress is mediated in part by pain. A common patient experience is pain during

Table 1
Survey tools to help identify patients with post-traumatic stress disorder, depression, and anxiety

Survey	Time to Complete (Min)	Questions	Possible Range of Points	Population	Point Ranges for Detection	Uses
PTSD PTSD Checklist [80]	5-10	17	17-85	Normal population range	30-35	Screening
				Specialized clinics range VA, mental health clinics range	36-44 45-50	Diagnosis Monitoring symptoms
Depression Patient Health Questionnaire (PHQ-9) [81]	1-5	9	0-27	Normal population range	0-4	Screening
				Mild depression range	5-9	Diagnosis
				Moderate depression range	10-14	Monitoring symptoms
				Moderately severe range Severe depression range What is considered 'depressed'?	15-19 20-27 14	
Beck Depression Inventory (BDI) [82,83]	10	21	0-63	Normal population range	0-13	Screening
				Mild depression range	14-19	Diagnosis
				Moderate depression range	20-28	Monitoring symptoms
Anxiety Generalized Anxiety Disorder (GAD-7) [84]	1-5	7	0-21	Severe depression range What is considered "depressed"?	29-63 ≥20	
				Normal population range	0-4	Screening
				Mild anxiety range	5-9	Diagnosis
				Moderate anxiety range	10-14	Monitoring symptoms
State-Trait Anxiety Inventory (STAI) [56,85,86]	10	40	20-80	Severe anxiety What is considered "anxious"?	≥15 ≥10	
				Normal population range	20-38	Screening
				What is considered "anxious"?	≥39-40	Diagnosis Monitoring symptoms

VA = Veterans Affairs.

acute care and after discharge. A systematic review has shown that several pain coping methods have been described in patient populations, including orthopedic trauma. First, patient education interventions about the neurophysiology of pain help patients understand that passive and active pain is a neurologic response and not a threat to increased injury [65]. This realization can help patients more fully engage in movement, rehabilitation activities, and reintegration into exercise programs. Second, pain counseling and mind-body therapies have been used to help with pain control in populations with chronic musculoskeletal pain [66]. This concept can be applied to trauma survivors who are recovering with significant pain symptoms. Among patients receiving acute trauma care for hip fracture, regular counseling during the hospital stay can reduce pain severity, attenuate sleep disturbance, and reduce the need for pain medicine compared with patients who do not receive counseling [60]. A mind-body technique of mindfulness-based

stress reduction uses meditation, body awareness, and yoga postures to help reduce musculoskeletal pain. Another mind-body technique is cognitive behavioral therapy, in which maladaptive behaviors, negative emotions, and cognitive process are modified with goal-oriented procedures. These collective therapies can be administered to patients by therapists or by automated computer programs that guide users through program steps. It is likely that acute care pain counseling could be beneficial for patients with multitrauma and other fractures, but this intervention has yet to be examined. Third, a case series revealed that hypnosis may also be effective for pain control while recovering from multiple fractures [67]. These techniques may empower the patient to control pain symptoms, which in turn improves self-efficacy and rehabilitation gains. Additional rigorous, controlled comparative efficacy studies using each of these coping skills for pain would be important for clinicians and patients.

Meditation and Mindfulness

Mindfulness and meditation are gaining attention as cost-effective alternatives to medication treatment for psychological distress after trauma. Meditation is a complementary and alternative medicine approach that assumes different forms. Forms may include the practice of "loving kindness" (which increases positive emotions through exercises that foster compassion, unconditional benevolence, goodwill, and friendliness for self and others) [68], use of a mantra (ie, silent repetitions of a phrase to reduce distraction), guided meditation (ie, forming mental images of places or situations that are relaxing), and transcendental meditation. Meditation can help patients overcome the fears, concerns, and emotions that may be blocking them from full engagement into recovery. Mindfulness can help develop a focus on the present and can increase awareness of bodily sensations [68]. Among a cohort of veterans, mindfulness during daily activities can help combat phobias, reduce avoidance behaviors [69], and overcome stressful situations during recovery and beyond. The opportunity exists to use these techniques to help orthopedic trauma patients feel supported during their hospital stay and in postacute settings.

Future Directions

These collective findings suggest that nonjudgmental social support provided to patients by nonfamily members is important to the patient's positive outlook while he or she is in the hospital. These cohorts, small randomized controlled studies, systematic reviews of interventions in similar patient populations, and case series provide intriguing evidence of the potential benefits of these interventions in acute or postacute care. Additional large, randomized controlled studies could provide insight on the comparative efficacy of different counseling or pastoral care programs on psychological distress acutely and in the long term in persons recovering from trauma. Further research on the responsiveness of patients of varying ages, injuries, and postacute settings to counseling, pastoral care, meditation, mindfulness, and pain coping skills would help identify patients more likely to obtain benefit from these interventions. Prospective evidence is needed to determine whether the long-term trajectory of psychological and physical health is improved by the use of these interventions.

Mitigating Stress From the Hospital to Home

Many trauma patients are discharged to an inpatient rehabilitation hospital setting. While patients are receiving care in rehabilitation programs, personal expectations for success are high. The patient may

experience difficult days when goals are not met because of pain or other required medical procedures that detract from therapy time. Alternately, patients may feel positive, joyful, and enthusiastic as function returns and plans are made for discharge to home. Increasing practitioner and support network awareness of possible fluctuations of psychological status is important. As the patient's emotional status changes, the care team can support the patient and creatively modify rehabilitation activities to keep a forward momentum toward discharge goals.

The positive outlook can rapidly deteriorate when the patient returns home, and depression symptoms could emerge [70]. This transition step from a care environment to home is a key step that is often overlooked. To help address this issue, the American Trauma Society and collaborators have created the Trauma Survivor's Network (TSN). The TSN consists of different interventions to help patients transition from the hospital setting to home [3,22]. Interventions include peer support (via peer visitation, support groups, and a Web site), self-management (eg, problem solving, forming relationships with their providers and other trauma patients, and goal setting), information and resources (eg, patient and family education and handbooks) and provider training (TSN coordinators provide training for clinicians) [22]. The program can have a positive effect on psychological distress and improve clinician sensitivity to the patient experience [3]. Initial implementation of the program resulted in a decrease in depression rates and trends toward physical function, self-efficacy, and mental health [3].

Long-term psychological stress is associated with several patient factors such as poor physical function, younger age, alcohol issues, low sense of self-efficacy, non-white race, poverty, and limited social support [15,71]. Other studies have confirmed that younger people [71], especially younger women, have higher levels of PTSD symptoms than do older people [17]. Limited evidence suggests that there are ethnic differences in the prevalence of PTSD symptoms after a musculoskeletal injury, with Hispanics being approximately 7 times more likely to experience PTSD compared with non-Hispanic whites [72]. Directing these patients at risk for long-term challenges to the TSN or similar support programs could be highly beneficial for long-term health. Psychiatry teams can play a critical role in helping to identify patients at risk for distress and connecting them with resources that can help patients make the transition to home.

Concerns in Survivors With Lingering Psychological Distress

Some survivors are challenged by lingering issues that interfere with QOL, including chronic pain,

reliance on pain medication, negative emotions, and social isolation. Persistence of musculoskeletal pain after major trauma is a serious problem. Long-term pain is predicted by psychosocial factors such as PTSD [73], anxiety [74], and catastrophic thinking [5], but not by the injury severity or patient descriptors (eg, age, sex, and occupation). These findings were present across an array of injuries including the back [73] (as a result of a car accident or falls) and multiple fractures [5]. Pain is related to negative psychological conditions. It is not yet clear whether the pain triggers a reminder of the traumatic event or if a “re-experience” of the trauma causes the pain [75]. Depression and anxiety scores are directly correlated to musculoskeletal pain intensity [76]. Although depression and anxiety can independently contribute to pain, the combination of the two contribute more to pain severity [77]. Among patients with psychological distress, those who display characteristics of catastrophizing are the most likely to demonstrate pain interference behaviors [78], where pain impedes daily living activities. Rehabilitation teams can collaborate with pain physicians and psychiatrists to develop appropriate pain control regimens and a long-term plan for helping the patient overcome personal challenges that may be interfering with functional improvement.

Higher psychological stress scores are related to opioid use up to 2 months after musculoskeletal trauma. Reliance on pain medications for coping can occur after any orthopedic injury or trauma surgery [12]. This behavior may interfere with full focused engagement in rehabilitation activities or reintegration into an active, full life.

Negative emotions of hopelessness and humiliation can develop after trauma. These feelings can be centered around the injury itself and by the impact of the injury on unemployment, financial loss, and loss of life purpose. Living alone or living in quarters with limited access to other social amenities can isolate the survivor. Some injuries that restrict the survivors from leaving their home or from driving further separate the survivor from social interaction. Rumination on fears related to the trauma can contribute to phobias. When these negative emotions dominate life, physical inactivity and suicidal ideations can emerge [79]. PTSD and depression are risk factors for the onset of suicidal ideation. Regular follow-up contact by the medical care teams and patient engagement in social activities and physical activity may help to offset the effects of negative emotions on QOL.

Support Networks and Groups

The long-term health of the trauma survivor can be enhanced by strategies that connect the survivor to a network of people with similar experiences or injuries,

such as support groups and social networks. Connectedness to others through participation in support groups helps the survivor in several ways [34]. Patients can develop new relationships that become personal resources or can have opportunities to identify with other people like them. Social support can help patients put their injury into perspective and reframe their status in the context of others with similar injuries. Group memberships can help attenuate the life disruption during the recovery [34]. Participation in supportive groups or opportunities provides a platform for patients to share successes and combat social isolation. Examples may include local sport “teams,” social groups, peer visitation, community activities at local library chapters, and the TSN support groups. Support networks and groups are intended to empower the survivor to handle the stresses involved in recovery and enjoy QOL. If they are not already doing so, care teams may consider recommending local support groups or social networks as part of the discharge plan. Drawing attention to the social and support needs of the patient demonstrates a commitment to the patient’s overall well-being after the transition to home.

Conclusions

Psychological distress affects a substantial proportion of patients with orthopedic trauma injury. Early identification of patients at risk for distress can help practitioners direct the appropriate resources to patients in need. Options for distress reduction include counseling, pastoral care, coping skills for pain, self-management, and meditation and mindfulness, along with group support and networks. Education and information about trauma and recovery processes can help patients make sense of symptoms during recovery. Rehabilitation gains and QOL may be optimized when survivors are empowered to focus on the present, attain a positive outlook, stay connected to other people, and develop a new life purpose.

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Disclosure

H.K.V. Department of Orthopaedics and Rehabilitation, Interdisciplinary Center for Musculoskeletal Training and Research, Divisions of Research, Physical Medicine and Trauma, College of Medicine, University of Florida, Gainesville, FL. Address correspondence to: H.K.V., Department of Orthopedics and Rehabilitation, Division of Research, UF Orthopaedics and Sports Medicine Institute, PO Box 112727, Gainesville, FL 32611; e-mail: vincehk@ortho.ufl.edu
Disclosure: nothing to disclose

M.H. Department of Orthopaedics and Rehabilitation, Interdisciplinary Center for Musculoskeletal Training and Research, Divisions of Research, Physical Medicine and Trauma, College of Medicine, University of Florida, Gainesville, FL
Disclosure: nothing to disclose

K.R.V. Department of Orthopaedics and Rehabilitation, Interdisciplinary Center for Musculoskeletal Training and Research, Divisions of Research, Physical Medicine and Trauma, College of Medicine, University of Florida, Gainesville, FL
Disclosure: nothing to disclose

S.T.B. Department of Orthopaedics and Rehabilitation, Interdisciplinary Center for Musculoskeletal Training and Research, Divisions of Research, Physical Medicine and Trauma, College of Medicine, University of Florida, Gainesville, FL
Disclosure: nothing to disclose

K.K.S. Department of Orthopaedics and Rehabilitation, Interdisciplinary Center for Musculoskeletal Training and Research, Divisions of Research, Physical Medicine and Trauma, College of Medicine, University of Florida, Gainesville, FL
Disclosure: nothing to disclose

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