



# Stress Disorders: the Trauma Surgeon as the Second Victim

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## Abstract

**Purpose of Review** We review the vocabulary and studies regarding stress disorders, as it relates to trauma care providers, specifically trauma surgeons. In addition, we make recommendations regarding strategies to address the needs identified and future areas of research to assess the adequacy of these strategies.

**Recent Findings** Stress disorders in trauma are common and constant, identified at levels similar to those seen among first-responders to mass-casualty events. These disorders are identified at every level—from trainee to the most experienced. Trauma surgeons experience the trauma firsthand, as well as through forced re-traumatization as a part of routine care. High levels of cumulative stress result due to the volume of patients that can be difficult to process due to the frequency of shifts and disrupted sleep patterns. This level of chronic stress can lead to a cycle of burnout and increased stress, which is harmful to surgeons and patients.

**Summary** Stress disorders are common and poorly understood. Treatment options are infrequently encountered. In order to more adequately respond to this, systematic change is necessary.

**Keywords** Post-traumatic stress disorder · Acute stress disorder · Moral injury · Burnout · Secondary traumatic stress

## Introduction

The foothold that injury has on society is clear and arguably unmatched. Traumatic injury, including unintentional injury, homicide, and suicide, accounts for the largest number of deaths each year in America for people between the ages of 1 and 54. It is the fourth leading cause of death among all age groups in 2020 [1], behind heart disease, cancer, and COVID-19. Approximately 272,000 people die each year as a result of traumatic injury [1]. Emergency departments see 35 million injured patients each year [2]. Traumatic injuries account for a significant cost to our healthcare system, with estimates of \$37 billion dollars spent on those admitted to the hospital [3] and \$327 billion in total health care costs [4]. Traumatic injury is also a leading cause of disability among working-aged Americans. The negative impact of injury is not isolated to the patient's physical recovery but encompasses a range of psychosocial needs and limitations.

Additionally, the burden of injury extends to the family and community to which the patient belongs. This includes the burden of providing financial assistance and/or direct care, as well as the psychological burdens of seeing the ramifications of a traumatic injury and their recovery. This well-established myriad of negative outcomes related to injury still does not paint a full picture of the downstream effects. There is a “second victim” in these traumatic cases—those caring for the injured.

A variety of personnel respond to traumatic events and care for injured patients. They, too, are potentially impacted by the traumatic incident. The impact of caring for the injured has been studied in first responders. Fifteen of these 20 studies came from the surveys surrounding the terrorist attacks on September 11, 2001, which found that firefighters, emergency medical services personnel, and police officers had higher rates of probable post-traumatic stress disorder (PTSD) (6.3–22.0%, 6.5–14.1%, and 2.5–9.8%, respectively) relative to the general population (typically around 3–5%) [5]. Trauma surgeons also share in the impact of a major traumatic incident, as shown by a recent study that revealed that the rate of probable PTSD among trauma surgeons is 16.3% [6••]—a figure very similar to that of first responders of 9/11. The authors believe that this can be reframed to

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say that at any given moment, trauma surgeons have their own 9/11-level event just through providing routine care for their patients. Given the sheer number of encounters, types of injury and bodily harm among this patient group, and the repetitive nature of these incidents experienced by trauma surgeons, this resilient group is vulnerable to the psychological and emotional toll of the job.

The following narrative is a personal experience from one trauma surgeon:

*Merely the sound of my pager alarming sends me into a fight-or-flight response mode. It read, "Pediatric alpha trauma alert: 2 yo male, GSW, unresponsive." Immediately, I have questions and emotions that won't be answered until I meet this patient face-to-face. The anticipation of the unknown is chilling. I arrive, standing alongside a team of professionals (residents, advanced providers, nurses, and staff) trained to exchange emotion and curiosity for knowledge, skill, and experience. There is a sense of hope, that we might reverse what is and achieve what could be. We want to save lives—every single one; but sometimes, despite using every resource at our disposal, we fail. We failed to save the life of one who had so much more life to live. Amid defeat, and in effort to save morale, I thank the entire team for performing their duties in a heroic and professional manner. We learn that this tragic accident occurred while two children were playing, and one got hold of a loaded gun. I, then, gathered the courage to tell a mother that I could not save her son. This feeling of doom, honor, and powerlessness is piercing and perpetual. I don't try to predict the day or time, but I know it will happen again... and again. It's simply part of my contribution to society.*

*Caring for trauma patients is sometimes a heartbreaking job. This statement does not come with a reference—it is a fact, just as the sky is blue. Sometimes, we get a win, and sometimes we must face the fragility of human life.*

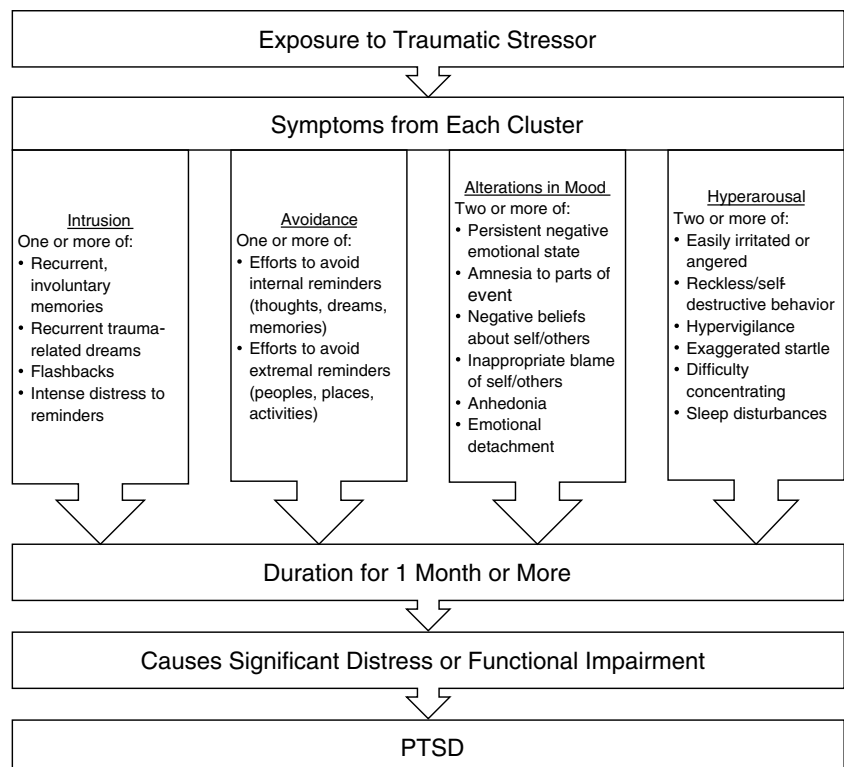
## Working Definitions

At times, the terminology used to describe the conditions of stress and its ramifications can be difficult and overlapping. After an exhaustive review of the literature, the authors came to the conclusion that there are two clinical diagnoses associated with stress—acute distress disorder and post-traumatic stress disorder. Furthermore, these underlying stressors for most care providers typically comes from one of two interactions—secondary traumatic stress or moral injury. While there are other terms that have been used and may be overlapping or tangentially related (i.e., empathy-based strain, professional burnout), the authors believe that the four terms selected encompass the appropriate clinical diagnoses, as well as the underlying source of stress for providers. Rather than discussing them from within their

context of presentation, we will discuss them within the context of their development as diagnosable conditions to establish a framework through which we use these terms.

Post-traumatic stress disorder (PTSD) has its roots in psychiatric care within the military. First noticed in the two world wars, psychiatrists noted that soldiers had severe emotional distress in response to the trauma that they experienced in combat [7]. This was commonly called “war neurosis,” “shell shock,” or, as labeled in the first edition of the *Diagnosis and Statistical Manual of Mental Disorders* (DSM), “gross stress reaction” [7, 8]. The dominant theory was that the distress would resolve when the person was removed from the stressful situation, despite concurrent research which showed that most of the distress did not manifest until after they were removed, and it persisted for months to years [7]. This diagnosis was dropped from the newly revised second edition (DSM-II) but was reinstated in the third edition (DSM-III) after extensive work from and with Vietnam veterans [7, 8]. This was defined as a reactive disorder that developed not during the traumatic event, but well after, typically defined as more than 1 month after the event [7]. The current edition of the *Diagnosis and Statistical Manual of Mental Disorders* (DSM-5) described post-traumatic stress disorder as the result of exposure to actual or threatened death, injury, or sexual violence [9]. These results in intrusive stimuli (i.e., memories, dreams, flashbacks) that results in avoidance of repeat stimuli, negative alterations in mood (negative thoughts, loss of interest), and hyperarousal associated with the traumatic event [9]. These four criteria (intrusive stimuli, avoidance of stimuli, negative alterations in mood, and hyperarousal) are considered four clusters of symptoms, and one or more manifestations is required from each cluster (two from negative alterations in mood and hyperarousal). The diagnostic criteria are listed in full in Fig. 1. It is important to note that it is no longer required that the person having PTSD be directly exposed to the trauma (victim, eyewitness, etc.), but may experience PTSD through exposure to repetitive or extensive details of a traumatic event or other secondary involvement [9, 10]. This is especially notable within the context of caring for trauma patients, as the daily deluge of patients with traumatic injuries can lead to such a great degree of exposure to these types of traumatic details, creating an environment where team members may develop stress disorders.

Acute stress disorder (ASD) was first introduced in the DSM-IV to describe patients who had severe symptoms that went beyond acute stress reaction or adjustment disorders, as well as to describe a prodrome of symptoms that may predict development of PTSD. The diagnosis in DSM-5 has attempted to more fully capture this prodrome by largely mirroring the PTSD diagnosis. In the current edition, patients must have been exposed to a traumatic event

**Fig. 1** Diagnostic criteria

(either directly, through repeated or extensive details from the event, or other secondary involvement) with subsequent manifestations of intrusion, negative mood, dissociation, avoidance, and hyperarousal for more than 2 days but less than 1 month [11]. Unlike PTSD, there are no requirements that symptoms be from each cluster. This was done to allow for a greater degree of sensitivity to bring about earlier identification of patients at risk for PTSD [12].

Secondary traumatic stress (STS) was initially a unique and separate condition from the acute stress disorder. STS was first well described in 1995 as the natural result of knowing about a traumatic event involving someone close to you (significant other, family member, client) and the stress from the desire to help [13]. This typically falls under a cluster of syndromes that are loosely described as “empathy-based strain,” which also includes vicarious traumatization and compassion fatigue [14]. With the newer definitions of ASD and PTSD that allow for indirect exposure, secondary traumatic stress would now largely fall under the definition of ASD/PTSD.

Moral injury is a concept also developed out of care of patients affected by combat situations. Moral injury, which has been described as a sort of psychological trauma, occurs when one violates their closely held moral and ethical standards in the pursuit of outcomes shaped by external forces [15]. For example, many soldiers have cited injuries or deaths inflicted on civilians as part of combat as bringing about a moral injury [16]. Historically, this was not thought of as PTSD, as the

soldiers may not be under direct threat themselves, nor were they providing care for the individuals afterward [17, 18, 19]. There is a significant body of literature that shows that moral injury and PTSD are commonly found together [17, 19, 20], with moral injury often serving as a potential exacerbator of the underlying trauma [17, 20, 21] or even the underlying stressor that leads to PTSD [15, 22, 23, 24, 25].

Taken together, these four concepts allow for a more complete understanding of our response to stress and its associated negative ramifications that manifest as a disorder. The framework that is most helpful described both acute stress and post-traumatic stress disorder as originating from either fear-based, loss-based, or moral injury-based stressors [15]. Trauma providers face each of these through our daily work. We experience fear-based stress in providing high-risk care to the sickest patients. We experience loss-based stress through the worries of watching a patient die that we could not save. We experience moral injury-based stress as we try to provide the best care despite limitations imposed upon us by an imperfect system that is not able to provide equitable outcomes to all.

This high level of stress may have significant downstream effects—likely manifested as professional burnout. Professional burnout was first described in human services industries [26]. It has a gradual onset comprised of emotional exhaustion, depersonalization, and loss of sense of personal accomplishment [26]. These feelings are often intertwined with empathy-based strain and stress disorders,

whether they serve as the antecedent that prevents healthy processing of a stressor or as the outcome of a stressor that leads to feelings of burnout.

## Complicating Factors

In review of the literature, there is evidence to support the idea that stress disorders predate attaining the level of an autonomous attending surgeon. Joseph et. al examined levels of stress among junior and senior residents and attendings, findings that residents have biologic activity levels indicating that they feel stress during 70% of their shift [27•]. A national survey of residents revealed that 22% had PTSD, more than three times the general population, and another 35% were considered “at-risk” [28]. Bullying, feeling overwhelmed, and caring for injured patients were among the most frequent causes of stress among residents. Additionally, more junior residents had higher rates of PTSD. The transition from training into practice can also bring about unique stressors such as student loan repayment, business structure of practice, and the familial and social changes related to relocation for work [29•]. Thus, junior surgeons are at risk for stress disorders during their early training years, as well as in the transition to practice.

There are several recognized points in time where trauma surgeons performing their occupational duties may themselves experience traumatization. Trauma surgeons are potentially traumatized on presentation of the injured patient that has suffered from violence or bodily harm, intraoperatively with difficult cases, while retelling of the cases with families and with the surgical team on rounds, and upon review of cases (i.e., mortality and morbidity conferences) [30]. Therefore, the care of each trauma patient may result in several instances of forced re-traumatization for the trauma surgeon. While one case brings about a high level of cumulative stress, the sheer volume of patients that a trauma surgeon cares for further compounds this issue. Additionally, trauma surgeons work longer and more frequent shifts with disrupted sleep patterns resulting in increased vulnerability to chronic stress [31]. Aside from patient care, personal lives, business, student loans, family, and health are among stressors of life that are not unique to trauma surgeons but certainly contribute to their overall level of stress [29•].

Mass casualty events (MCEs) and the COVID-19 pandemic are special circumstances that have had a disproportionate psychological impact on trauma surgeons. One study held qualitative interviews with 17 physicians caring for patients in MCEs that took place across the country from 2012 to 2018. The physicians experienced a significant emotional and psychological impact due to these MCEs. They shared their experiences

of feeling overwhelmed, pressured to have good outcomes, the challenges of massive media attention, and forced re-traumatization after the event [32•]. Several studies have examined PTSD as a byproduct of the COVID-19 pandemic. Members of the Eastern Association for the Surgery of Trauma were administered a survey on the effects of the pandemic [33•]. It was noted that the incidence of PTSD among this group of trauma and acute care surgeons was 16.3%. The following characteristics were identified as risk factors: not married, someone close with COVID-19, family issues due to COVID, rural and suburban practices, and lack of mental health resources at work. Another author found that traumatic stress related to COVID-19 produced PTSD more strongly when cumulative trauma was already present [34].

All the aforementioned factors contribute to cumulative and chronic stress experienced by trauma surgeons. This results in half of all trauma surgeons having feelings of burnout, the highest rate of burnout among all surgical subspecialties, and quality of life survey score that is well below that of the normal population [31]. This level of cumulative stress and burnout can lead to an ongoing cycle that potentially results in harm to the providers and patients. For example, it has been shown that there is a correlation between cumulative stress, burnout, and errors in clinical judgment, as well as early departures from practice, health issues, and substance abuse [35]. Cumulative stress leads to burnout, which leads to more cumulative stress in a cyclical pattern.

Considering each of these factors—dealing with recurrent trauma both within and between cases, dealing with sometimes overwhelming clinical needs, and the cumulative and chronic effects of these stressor—it is no surprise that trauma surgeons bear a high burden of stress disorders.

## Current Treatment Options

A host of recommended treatment options for healthcare providers who experience acute and chronic stress have been explored and discussed in the literature. The authors seek to classify the current treatment options into the following categories: individual practices (specifically, prevention and treatment techniques), institutional procedures, and systemic policies.

In response to increasing physician burnout, wellness for providers has become a mainstream topic. In review of burnout among orthopedic surgeons, one author examined wellness as an inclusive approach to enhance one’s physical, mental, emotional, and spiritual elements [29•]. The physical component includes exercise, sleep hygiene, proper nutrition, and injury prevention. Strategies to improve mental wellness included visualization,

meditation and mindfulness, and resiliency training. Emotional wellness focuses on emotional intelligence, cognitive reframing, and self-compassion while spiritual wellness embraced passion, purpose, and gratitude. Similarly, other authors described six individual habits that counteract the negative impact of cumulative stress on surgeons. Sleep, exercise, meditation and mindfulness, gratitude, self-compassion, and connection to others are learned behaviors that should be incorporated into the daily routine of surgeons to continually reduce the impact of stress [35]. These are strategies that can be implemented by surgeons in real time and on an individual basis.

Beyond these sorts of prevention or mitigation strategies, it is important to highlight that untreated stress disorders have profound biologic, psychiatric, and social impacts on the individual and those around them. Biologic markers, such as blood pressure, cortisol, glucose, and inflammatory markers, are profoundly affected by these that can lead to poor health outcomes [36, 37, 38, 39]. Additionally, patients with PTSD are at markedly elevated risk of concomitant psychiatric diagnoses, such as anxiety, depression, and drug and alcohol abuse, as well as increased risk of social disruption, such as suicide attempts, disruption of homelife, and job changes/workplace attrition [37, 40, 41]. While the abovementioned strategies can be helpful, structured care facilitated by a professional is likely to be more efficacious [42, 43, 44, 45, 46]. Additionally, pharmacologic therapies can be helpful [47, 48, 49]. While there are a multitude of barriers to care identified throughout the literature, the fear of mental health stigma is one of the most commonly cited, specifically concerns around its effect on medical licensure [50, 51, 52, 53]. Recent protections have been enacted to ensure confidentiality and professional protection for those seeking care [54]. In addition, the increase availability in telehealth visits and the demonstrated efficacy of these visits in PTSD may likely encourage more providers to seek out these services in a confidential manner [55, 56].

There are several institutional processes and procedures to reduce the burden of stress among surgeons. The first requires a shift in institutional culture to one that nurtures a supportive environment. One European study identified that 55% of providers identified a lack of institutional support and “blame culture” as contributors to negative outcomes. Structured mentoring, counseling, openness, peer support groups, and training were all recommended at the institutional level [57]. The second requires the establishment of programs which provide proactive support and a holistic approach to wellness. One such program, called Assaulted Staff Action Program (ASAP), is a system-wide crisis intervention program that provides support for employees harmed by patients [30]. This model serves as an example of a process and procedure established by an institution to support staff. Similar processes should be

established to support providers who are vulnerable to occupation-induced stress. In addition to creation of new programs, removal of administrative tasks unnecessary to patient care may play a role in reducing physician burnout [58, 59, 60, 61, 62].

Regarding the systemic policies targeting stress of providers caring for injured patients, there have been few evidence-based approaches described in the literature. This gap in knowledge is certainly one to prioritize among researchers in this field. There have been increasing calls to address burnout and stress among healthcare providers from both the US Surgeon General and the National Academy of Medicine’s National Plan for Health Workforce Well-being [63, 64]. Among medical students, there has been a systemic policy change, with the ACGME mandating all accredited residency and fellowship programs “to address well-being more directly and comprehensively” [65]. While there is currently no standard of practice for this mandate, steps like this should be applauded. At the undergraduate medical education level, there is no similar mandate for medical schools from the AAMC, and many medical schools have instituted various wellness programs. There is no known mandate for trauma centers to provide wellness programs for the trauma team.

## Strategies Moving Forward

After review of the current literature regarding stress disorders among trauma surgeons, there is certainly a problem and a need for impactful solutions. The authors extend several recommendations for strategies that might enhance existing practices.

1. The evidence shows that all trauma providers, regardless of the stage of their careers, are vulnerable to stress disorders. Younger providers, including residents and medical students, likely experience a disproportionate share, as they are inexperienced and untrained in dealing with these stressors. This group is often overlooked, as they may not be considered to bear full legal responsibility for patient care. It is important to train medical students and residents to identify traumatic stress and to provide them with accessible mental health resources. There must exist a culture that prioritizes the health and wellness of trainees and emphasizes positive coping mechanisms.

*We recommend the integration of wellness training into the existing medical school and general surgery residency curricula. We also support mandating that medical students and residents have unobstructed*



*access to mental health experts throughout the duration of training.*

2. The evidence supports the idea that stress disorders and burnout are high among trauma surgeons. In order to ensure our trauma system is functioning at its highest level, we must prioritize the wellness of the trauma surgeon.

We recommend that institutions caring for injured patients shy away from a “blame culture” and embrace a culture of shared responsibility, quality improvement, and education.

We also recommend that American College of Surgeons Committee on Trauma Verification, Review, and Consultation Program require those centers to provide trauma surgeons with mental health resources and ensure access to mental health professionals.

## Conclusion

Traumatically injured patients will continue to need care from dedicated teams. Providing care for trauma patients is often a heartbreaking job, as it reminds us of humanity’s mortality. The providers bear this burden of heartbreak which encompasses stress that is often cumulative and cyclical. The nomenclature describing the stress endured by providers can be confusing and often overlapping. It has been largely streamlined into acute and chronic stress disorders that play a cyclical role with burnout. While secondary stress is widely acknowledged, institutional and systematic solutions are few and underdeveloped. In effort to confront the challenges of providing care to the injured, we must be intentional about caring for the caregivers [66•, 67•, 68••, 69•, 70••].

## Declarations

**Competing Interests** The authors declare no competing interests.

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- Of importance
- Of major importance

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- 70.●● Warren AM, Jones AL, Shafi S, Roden-Foreman K, Bennett MM, Foreman ML. Does caring for trauma patients lead to psychological stress in surgeons? *Journal of Trauma and Acute Care Surgery*. Lippincott Williams and Wilkins. 2013;75:179–84. **(Secondary traumatic stress (STS) was found in 21% of all surgeons. The original hypothesis was that STS would be more common in those that treated trauma patients, but providers that spent most of their time caring for trauma patients were no more likely to be at risk for STS as those who spent little time.)**

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