

What Is Posttraumatic Stress Disorder?

Arieh Y. Shalev, M.D.

Our understanding of posttraumatic stress disorder (PTSD) has increased significantly over the last 2 decades. Although the cause of the condition is usually easy to determine in individual patients, the symptoms of PTSD are diverse and a mixture of psychological processes are involved. This article presents a broad overview of PTSD, including its definition according to DSM-IV and ICD-10 diagnostic criteria, and its clinical course with reference to its association with depression and other mental disorders. The article also briefly reviews the assessment of patients and considers physiologic features such as responses to startle stimuli that appear to be useful in diagnosing PTSD and in differentiating it from other anxiety disorders and depression. Finally, a brief overview of the treatment of PTSD is given, including psychological and biological treatment options.

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Our understanding of posttraumatic stress disorder (PTSD) has increased markedly over the last 2 decades, following the first use of the term to describe the condition in returning Vietnam veterans in 1978¹ and the first official recognition of the syndrome by the American Psychiatric Association in 1983. This distressing disorder presents an important challenge to the psychiatric profession as, although the event that triggers the condition is usually easy to determine, the resulting symptoms are diverse and represent a mixture of social, biological, and psychological processes (e.g., social withdrawal, memory impairment, abnormal startle response, fear conditioned responses). This article presents a broad overview of PTSD, including its definition, clinical course, assessment, and drug treatment.

DEFINING PTSD

Given its primarily phenomenological description, PTSD is principally defined by the presence or absence of typical symptoms. However, PTSD may also be characterized by a number of psychobiological processes and cognitive and biological features. PTSD is classified as an anxiety disorder and is typically defined by the coexistence of 3 clusters of symptoms, namely *reexperiencing*, *avoidance*, and *hyperarousal*.

The symptoms of reexperiencing relate to an overwhelming sense of reliving the traumatic event, with feelings of fear and panic, and with corresponding physiologic responses such as tachycardia. This reexperiencing is accompanied by persistent avoidance, both of stimuli associated with the trauma and other stimuli (even those previously considered pleasurable). Thus, in addition to avoiding activities or places associated with the traumatic event, which would be explainable as a direct learning experience related to exposure, patients also avoid unrelated situations and events and show a diminished interest in participation in significant activities, feelings of detachment and estrangement from others, or a sense of having a foreshortened future. These symptoms resemble those seen in major depression. Hyperarousal may manifest as insomnia, anger, difficulty in concentrating, hypervigilance, and an exaggerated startle response. Again, these symptoms are unrelated to avoidance of reminders of the original traumatic event and serve to illustrate the diverse and complex symptomatology of PTSD.

Table 1 shows the *Diagnostic and Statistical Manual of Mental Disorders*, Fourth Edition, (DSM-IV) criteria for the diagnosis of PTSD.² The criteria for the definition of PTSD published by the World Health Organization in their 10th revision of the *International Classification of Diseases* (ICD-10)³ are broadly similar to those in DSM-IV (Table 2). However, a number of important differences between the 2 systems exist. For example, while ICD-10 prefers that only 1 diagnosis be given to a patient, the DSM-IV system encourages the making of multiple diagnoses, thereby increasing the amount of comorbidity reported. The most notable difference between the 2 systems, however, relates to the emphasis placed upon emotional numbing, which ICD-10 sees as a frequent accompaniment to PTSD but not necessary to make the diagnosis.

From the Hebrew University of Jerusalem Medical School and Department of Psychiatry, Hadassah University Hospital, Jerusalem, Israel.

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Reprint requests to: Arieh Y. Shalev, M.D., Professor of Psychiatry, Hebrew University Medical School, Jerusalem, Israel 91120 (e-mail: ashalev@cc.huji.ac.il).

Table 1. DSM-IV Criteria for the Diagnosis of Posttraumatic Stress Disorder (PTSD)^a

- A. The person has been exposed to a traumatic event in which both the following were present:
1. The person experienced, witnessed, or was confronted with an event or events that involved actual or threatened death or serious injury, or a threat to the physical integrity of self or others.
 2. The person's response involved fear, helplessness, or horror. (Note: In children, this may be expressed instead by disorganized or agitated behavior.)
- B. The traumatic event is persistently reexperienced in 1 (or more) of the following ways:
1. Recurrent and intrusive distressing recollections of the event, including images, thoughts, or perceptions. (Note: In young children, repetitive play may occur in which themes or aspects of the trauma are expressed.)
 2. Recurrent distressing dreams of the event. (Note: In children, there may be frightening dreams without recognizable content.)
 3. Acting or feeling as if the traumatic event were recurring (includes a sense of reliving the experience, illusions, hallucinations, and dissociative flashback episodes, including those that occur on awakening or when intoxicated). (Note: In young children, trauma-specific reenactment may occur.)
 4. Intense psychological distress at exposure to internal or external cues that symbolize or resemble an aspect of the traumatic event.
 5. Physiologic reactivity on exposure to internal or external cues that symbolize or resemble an aspect of the traumatic event.
- C. Persistent avoidance of stimuli associated with the trauma and numbing of general responsiveness (not present before the trauma), as indicated by 3 (or more) of the following:
1. Efforts to avoid thoughts, feelings, or conversations associated with the trauma.
 2. Efforts to avoid activities, places, or people that arouse recollections of the trauma.
 3. Inability to recall an important aspect of the trauma.
 4. Markedly diminished interest or participation in significant activities.
 5. Feelings of detachment or estrangement from others.
 6. Restricted range of affect (eg, unable to have loving feelings).
 7. Sense of foreshortened future (eg, does not expect to have a career, marriage, children, or a normal life span).
- D. Persistent symptoms of increased arousal (not present before the trauma), as indicated by 2 (or more) of the following:
1. Difficulty falling or staying asleep.
 2. Irritability or outbursts of anger.
 3. Difficulty concentrating.
 4. Hypervigilance.
 5. Exaggerated startle response.
- E. Duration of the disturbance (symptoms in criteria B, C, and D) is more than 1 month.
- F. The disturbance causes clinically significant distress or impairment in social, occupational, or other important areas of functioning.
- Specify if:
- Acute:* If duration of symptoms is less than 3 months.
- Chronic:* If duration of symptoms is 3 months or more.
- Specify if:
- With delayed onset:* If onset of symptoms is at least 6 months after the stressor.

^aFrom the American Psychiatric Association,² with permission.

Table 2. ICD-10 Criteria for the Diagnosis of PTSD^a

This disorder should not generally be diagnosed unless there is evidence that it arose within 6 months of a traumatic event of exceptional severity. A "probable" diagnosis might still be possible if the delay between the event and the onset was longer than 6 months, provided that the clinical manifestations are typical and no alternative identification of the disorder (eg, as an anxiety or obsessive-compulsive disorder or depressive episode) is plausible. In addition to evidence of trauma, there must be a repetitive, intrusive recollection or reenactment of the event in memories, daytime imagery, or dreams. Conspicuous emotional detachment, numbing of feeling, and avoidance of stimuli that might arouse recollection of the trauma are often present but are not essential for the diagnosis.

The autonomic disturbances, mood disorder, and behavioral abnormalities all contribute to the diagnosis but are not of prime importance.

The late chronic sequelae of devastating stress, ie, those manifest decades after the stressful experience, should be classified under F62.0.

Includes traumatic neurosis.

^aFrom the World Health Organization,³ with permission.

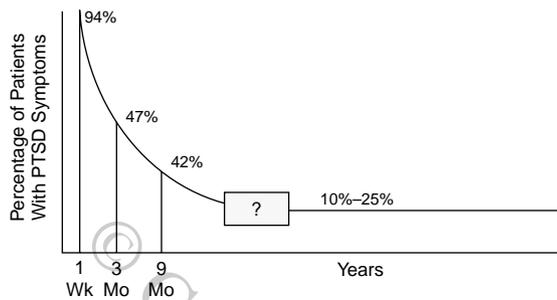
As can be seen from Table 1, symptoms must be present for at least 1 month for a formal diagnosis of PTSD. If symptoms are present for less than 3 months the disorder is termed *acute*, while symptoms enduring beyond 3 months denote *chronic* PTSD. There is currently disagree-

ment over the validity of another time-related disorder—the acute stress disorder. The DSM-IV diagnostic criteria regard the presence of dissociative symptoms as central to a diagnosis of acute stress disorder, which should not last for more than 1 month.

Delayed-Onset PTSD

Patients presenting with onset of symptoms 6 months or more after a traumatic event are said to have delayed-onset PTSD. There is conflicting information in the literature regarding the phenomenon of delayed-onset PTSD. Many cases that have been diagnosed as delayed-onset PTSD may in fact have represented delayed referral or exacerbation of partial, subclinical PTSD. For example, in a study by Solomon et al.,⁴ the comprehensive psychiatric medical files of 150 Israeli soldiers who sought psychiatric help for the first time between 6 months and 5 years after the 1982 Lebanon War were reviewed using DSM-III diagnostic criteria for PTSD. Notably, only 10% of these patients were classified by the reviewers as exhibiting delayed onset PTSD. A large proportion of cases (40%) were classified as delayed help-seeking, while 33% of cases were judged to represent exacerbations of partial, subclin-

Figure 1. Longitudinal Course of Posttraumatic Stress Disorder (PTSD)^a



^aAdapted from data presented by Rothbaum and Foa.⁸

Table 3. Recovery From Early PTSD^a

Study	Event Sample Size	1 Month	2–5 Months	6–12 Months	1–3 Years	3–6 Years	Recovery From PTSD
Solomon, 1989 ⁹	Israeli veterans (N = 238)	100	...	59	47	42	58%
Feinstein and Dolan, 1991 ¹⁰	MVA (N = 48)	25	...	14.6	...	...	42%
Rothbaum et al, 1992 ¹¹	Rape (N = 95)	65	47	...	...	...	...^b
Perry et al, 1992 ¹²	Burn victims (N = 51)	...	35	> 32	> 28	...	...^b
Blanchard et al, 1996 ¹³	MVA (N = 132)	39	31	12	...	...	66%
Shalev et al, 1997 ¹⁴ and Freedman et al, 1999 ¹⁵	Miscellaneous civilians (N = 236)	30	17	...	10	...	66%

^aAbbreviation: MVA = motor vehicle accidents.

^bRecovery rate not provided for studies lasting less than 1 year.

ical PTSD. Reactivation of PTSD in remission (13%) and reevaluation of patients diagnosed with other psychiatric disorders (4%) accounted for the remainder of cases. Similarly, in a more recent study⁵ in which we followed up 239 patients with psychiatric evaluations at 1 month, 4 months, and 1 year after their exposure to traumatic events, we found that only 5.7% of patients with PTSD at 4 months did not meet diagnostic criteria for PTSD at 1 month. At the 1-year assessment, only 5.1% of all PTSD cases did not suffer from PTSD at 4 months. These cases, however, showed partial PTSD symptoms at 4 months.

Thus, the true incidence of delayed-onset PTSD may in fact be much lower than has been reported, for example, in studies of World War II and Vietnam veterans,^{6,7} although it should be noted that the much longer follow-up period in these studies allowed for a higher chance of patients encountering stressful trigger events. It is clear that delayed-onset PTSD is a complex phenomenon, and there remains much to learn concerning the types of triggers, the variability of the latency period, and the true incidence of the condition.

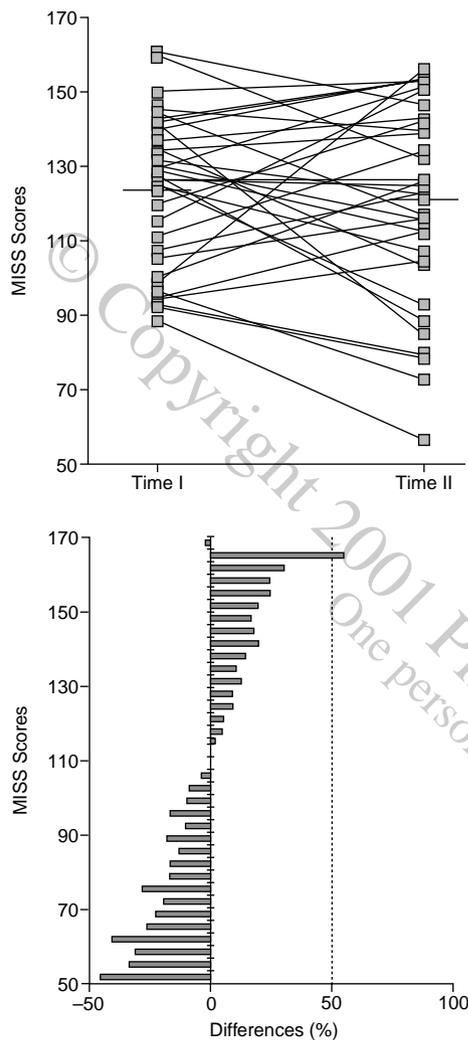
CLINICAL COURSE OF PTSD

In most cases, PTSD develops shortly after the traumatic event. Importantly, most patients who express symptoms of PTSD shortly after a traumatic event recover and do not develop prolonged PTSD. It is established that the number of patients expressing PTSD symptoms declines over time, with between 10% to 25% of those initially meeting diagnostic criteria for this disorder continuing to experience chronic PTSD (Figure 1).⁸

Table 3 summarizes data from key studies that have assessed recovery from PTSD in the short term (up to 5 months after trauma).^{9–15} As can be seen from the table, a significant proportion of patients show recovery within a relatively short time after trauma, with up to two thirds of patients recovering within 5 months in some studies. However, for a significant minority of patients, PTSD takes a prolonged, chronic course that may persist for many years or indeed for life. For example, a study of survivors of the collapse of a dam at Buffalo Creek in the United States found that 17% of adults still met the criteria for a diagnosis of PTSD 14 years after the event.¹⁶ Most notable, however, is the fact that some people are still found to suffer from PTSD over 50 years after the end of World War II.

Unfortunately, little is known at present regarding why some people continue to experience chronic PTSD while the majority recover from the acute response to trauma. In this regard, studies that have examined the acute and longer term biological responses to stress in subjects presenting at emergency rooms immediately after trauma exposure provide intriguing insights into the possible aberrations in the normal fear response that may herald the onset of PTSD and other psychiatric disorders. Studies by McFarlane et al.¹⁷ and by Resnick et al.¹⁸ in victims of motor vehicle accidents (N = 38) and rapes (N = 39), respectively, showed that those who went on to develop PTSD, as a group, had lower blood cortisol levels at the time of admission to the emergency room compared with subjects who did not develop a psychiatric disorder or those who went on to develop depression (see the article by Yehuda,⁵⁴ in this supplement). It should be noted, however, that neither of these studies recorded blood cortisol levels in subjects before the trauma, so that no statement can be made regarding the subjects' cortisol responses relative to baseline values. Data are also available that indicate that trauma survivors who go on to develop PTSD also show increased heart rates compared with those who do not develop the condition. A study of 84 trauma survivors without significant physical injury who had their heart rate measured at presentation to the emergency room found that mean heart rates were significantly higher in subjects who were subsequently diagnosed as having PTSD at 4 months (N = 20) compared with those who did not develop the condition.¹⁹ By contrast, early intrusive

Figure 2. Change in MISS Scores in 36 Vietnam Veterans With Chronic PTSD^a



^aAdapted from data presented by Niles et al.²⁰ Abbreviation: MISS = Mississippi Scale for Combat-Related PTSD.

avoidance or hyperarousal symptoms are poor predictors for the development of PTSD, because they tend to be expressed by the majority of trauma survivors.^{5,17}

Together, these findings suggest that the development of PTSD may be facilitated by an atypical biological response to trauma, which may in turn lead to a maladaptive psychological state. This atypical response might result from the presence of pretraumatic vulnerability factors. The study by Resnick et al.¹⁸ of blood cortisol levels in rape victims presenting to an emergency room is interesting in this regard. They found that the subgroup of women who had a previous history of sexual assault had significantly lower blood cortisol levels and a 3-fold greater probability of subsequently developing PTSD following the most recent assault, compared with women

with no previous history of sexual assault. This raises the possibility that prior traumatization resulted in attenuated hypothalamic-pituitary-adrenal axis responses to trauma in these women, which in turn may have rendered them more susceptible to subsequently developing PTSD (see the article by Yehuda⁵⁴ in this supplement). Further studies are required to investigate the early physiologic changes following trauma and elucidate their potential relationship with the subsequent development of PTSD. These studies might provide us with reliable early markers for vulnerable patients.

Another important question is whether early therapeutic intervention would reduce the number of patients who go on to suffer from chronic PTSD. Studies of the use of preventive intervention strategies in early stage PTSD are required to answer this question. What is clear is that those who recover from prolonged PTSD are likely to have some residual symptoms and a certain degree of dysfunction. These subjects may also be particularly vulnerable to subsequent stress and may develop the full PTSD syndrome again if they are once more exposed to significant trauma, a process known as reactivation. Reactivation may at least in part explain the often marked fluctuations in PTSD severity that are observed in subjects with chronic PTSD. A good example of this phenomenon is provided by the study of Vietnam War veterans with chronic PTSD conducted by Niles et al.²⁰ As shown in Figure 2, individual patients exhibited significant fluctuations in PTSD severity, as assessed by the Mississippi Scale for Combat-Related PTSD scores, of up to 50%.

COMORBIDITY IN PTSD PATIENTS

Subjects with PTSD often also suffer from concurrent depression, anxiety disorders, and substance abuse. Reports in the literature typically cite rates of concurrent depression of 30% to 50% in PTSD patients (Table 4). This overlap with depression is to some extent predictable when using the DSM-IV diagnostic process, which encourages multiple diagnoses and thus may promote reports of comorbidity. It is also notable that PTSD and depression share 10 of the 17 symptoms that constitute the Hamilton Rating Scale for Depression (depressed mood, feelings of guilt, suicide ideation, work and interest retardation, agitation, psychological anxiety, somatic anxiety, loss of libido, and weight loss). Although PTSD and major depression are independent sequelae of traumatic events, they have similar prognoses and interact to increase distress and dysfunction. Importantly, there are data that indicate that a history of major depressive disorder may increase the severity of posttraumatic morbidity.³⁰ In addition to depression, substance abuse is commonly reported in survivors of traumatic events,³¹⁻³⁴ physical health often declines,^{35,36} and social relationships can be adversely affected.³³⁻³⁷

Table 4. Association Between PTSD and Depression in Clinical Trials

Study	Population	N	PTSD (%)	Depression (%)	Overlap (%)
Green et al, 1990 ²¹	Vietnam veterans	200	29	15	34.5
Engdahl et al, 1991 ²²	WWII POWs	62	29	5.8	61
McFarlane and Papay, 1992 ²³	Firefighters	398	18 ^a	10 ^a	51 ^a
Ramsay et al, 1993 ²⁴	Survivors of state violence	100	31 ^a	42 ^a	64.5 ^a
North et al, 1994 ²⁵	Survivors of mass shooting	136	26	10.2	30.1
Blanchard et al, 1996 ²⁶	Help-seeking MVA ^b survivors	158/93 ^c	39.2	23.4	53
Kessler et al, 1995 ²⁷	Population sample	5877	7.8 ^a	17.9 ^a	48.2 ^a
Dew et al, 1996 ²⁸	Heart transplant patients	154	13.7	17.3	n/a
Bleich et al, 1997 ²⁹	Help-seeking war veterans	60	87 ^d /100 ^a	50 ^d /95 ^a	56 ^d /95 ^a
Shalev et al, 1998 ³⁰	Trauma survivors presenting at hospital ER	211	17.5	14.2	43.2

^aLifetime.^bMotor vehicle accident.^c158 case-control patients and 93 patients who received Clinician Administered PTSD Scale; Structured Clinical Interview for DSM-III-R (SCID).^dCurrent.

ASSESSMENT OF PATIENTS

The clinical interview is the cornerstone of the assessment of patients with suspected PTSD or other posttraumatic sequelae. It provides the opportunity to discuss the traumatic event with the patient, to listen to their perceptions of the event and its effects, and to make a careful appraisal of their symptomatology. Equally, it is vital to obtain details of the patient's pretrauma history and levels of adjustment. A number of semistructured interviews that assess the symptoms of PTSD are available,³⁸ of which the Clinician Administered Posttraumatic Stress Disorder Scale³⁹ (CAPS) has perhaps the best supporting data. A criticism of these interviews, however, is that they follow the DSM diagnostic criteria for PTSD too slavishly and may miss signs of the patient's wider psychopathology. There has been much interest in developing self-report instruments for use in assessing long-term outcome and response to treatment in patients with chronic PTSD. One of these measures, the 15-item Impact of Event Scale,⁴⁰ was specifically developed to assess the principal features of PTSD (i.e., intrusion and avoidance symptoms) and has been shown to correlate well with a diagnosis of PTSD.

A characteristic diagnostic feature of subjects affected by PTSD is their response to auditory startle stimuli. Patients with PTSD typically exhibit a lack of habituation to startle, which distinguishes them both from normal subjects and from those with depression. In a study by Orr et al.,⁴¹ 19 Israeli combat veterans with PTSD and 74 veterans without PTSD were exposed to 15 consecutive 95-dB (500-msec) tones while their orbicularis oculi electromyogram (EMG), skin conductance, and heart rate responses were measured. The subjects with PTSD had larger average heart rate responses and a slower decline in skin conductance responses across the 15 tone presentations compared with subjects who did not have PTSD. There was no significant difference between the groups

with regard to the magnitude of the EMG response. An earlier study⁴² showed significantly larger skin conductance and heart rate responses and a trend toward larger EMG responses in patients with PTSD compared with patients with other anxiety disorders, mentally healthy subjects with past traumatic experiences, and mentally healthy subjects with no history of trauma. In addition to responses to startle stimuli, the increased heart rate observed

in patients soon after trauma who went on to be diagnosed as having PTSD¹⁹ may prove to be another useful early diagnostic feature.

TREATMENT OF PTSD

Treatment modalities for PTSD can be divided into psychological and biological (pharmacologic) approaches. The former category includes behavioral, cognitive, and psychodynamic treatment modalities. Direct exposure therapies within a cognitive-behavioral framework may offer the most benefit. The majority of PTSD treatment packages include anxiety management techniques such as relaxation training, stress inoculation therapy, cognitive restructuring, and breathing retraining. The key element, however, remains the confrontation of the traumatic event by the patient through techniques such as systematic desensitization, flooding, prolonged exposure, and implosive therapy. One interesting new technique that has shown some initial promise is eye movement desensitization, whereby patients are asked to recall the traumatic event in images while systematically moving their eyes rapidly. It is not established whether the eye movement is necessary or whether it serves merely as a helpful distraction for patients while they expose themselves to the trauma memories and thereby become habituated.

With regard to pharmacologic intervention, antidepressants sometimes improve symptoms of intrusion and avoidance as well as depression, insomnia, and anxiety.⁴³⁻⁴⁶ Recently, selective serotonin reuptake inhibitors have been shown to significantly reduce PTSD symptoms in various populations, and the study of these and other antidepressants is very promising. However, the magnitude of the therapeutic response to these drugs is often short of bringing full remission. Mixed results have been obtained from the use of benzodiazepines,⁴⁷⁻⁴⁹ and severe withdrawal symptoms have been reported in some patients.⁴⁹ Agents that act to stabilize mood, including lithium,⁵⁰ val-

proate,⁵¹ and carbamazepine,^{52,53} have also been studied in open clinical trials in which they have been shown to reduce irritability and improve impulse control. Another anticonvulsant drug, topiramate, has recently shown promise in the treatment of PTSD, and results with this agent are reviewed by Berlant⁵⁵ elsewhere in this supplement.

In view of the complex symptomatology of PTSD, the mix of psychological processes involved (memory, imagery, startle response, fear, etc.), and the limitations of uni-dimensional treatment approaches to date, it may be that combination treatment strategies involving biological, psychological, and psychosocial modalities will prove more effective.

CONCLUSION

Much progress has been made in our understanding of PTSD in recent years with regard to refining its definition and increasing our knowledge of its clinical course and association with depression and other comorbid psychopathologies. Early progress has also been made in identifying certain physiologic features that may provide markers for risk of developing the disorder, and our overall management of affected patients continues to improve. However, it is also clear that PTSD continues to represent an important challenge to the psychiatric profession, and there remains much to learn about this distressing and disabling disorder.

Drug names: carbamazepine (Tegretol and others), topiramate (Topamax).

REFERENCES

- Figley CR. Psychosocial adjustment among Vietnam veterans. In: Figley CR, ed. *Stress Disorders Among Vietnam Veterans*. New York, NY: Brunner/Mazel; 1978
- American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition*. Washington, DC: American Psychiatric Association; 1994
- World Health Organization. *The ICD-10 Classification of Mental and Behavioural Disorders: Clinical Descriptions and Diagnostic Guidelines*. Geneva, Switzerland: World Health Organization; 1992
- Solomon Z, Kotler M, Shalev A, et al. Delayed onset PTSD among Israeli veterans of the 1982 Lebanon War. *Psychiatry* 1989;52:428-436
- Shalev AY, Freedman S, Peri T, et al. Predicting PTSD in civilian trauma survivors: prospective evaluation of self-report and clinician-administered instruments. *Br J Psychiatry* 1997;170:558-564
- Archibald HC, Tuddenham RD. Persistent stress reaction after combat. *Arch Gen Psychiatry* 1965;12:475-481
- Boulanger G. Post-traumatic stress disorder: an old problem with a new name. In: Sonnenberg SM, Blank AS, Talbott JA, eds. *The Trauma of War: Stress and Recovery in Vietnam Veterans*. Washington, DC: American Psychiatric Press; 1985
- Rothbaum BO, Foa EB. Subtypes of posttraumatic stress disorder and duration of symptoms. In: Davidson JRT, Foa EB, eds. *Posttraumatic Stress Disorder, DSM-IV and Beyond*. Washington, DC: American Psychiatric Press; 1983:23-35
- Solomon Z. Psychological sequelae of war: a 3-year prospective study of Israeli combat stress reaction casualties. *J Nerv Ment Dis* 1989;177:342-346
- Feinstein A, Dolan R. Predictors of post-traumatic stress disorder following physical trauma: an examination of the stressor criterion. *Psychol Med* 1991;21:85-91
- Rothbaum B, Foa E, Riggs D, et al. A prospective examination of post-traumatic stress disorder in rape victims. *J Trauma Stress* 1992;5:455-457
- Perry S, Difede J, Musngi G, et al. Predictors of posttraumatic stress disorder after burn injury. *Am J Psychiatry* 1992;149:931-935
- Blanchard EB, Hickling EJ, Barton KA, et al. One-year prospective follow-up of motor vehicle accident victims. *Behav Res Ther* 1996;34:775-786
- Shalev AY, Freedman S, Peri T, et al. Predicting PTSD in civilian trauma survivors: prospective evaluation of self report and clinician administered instrument. *Br J Psychiatry* 1997;170:558-564
- Freedman SA, Peri T, Brandes D, et al. Predictors of chronic PTSD: a prospective study. *Br J Psychiatry* 1999;174:353-359
- Green BL, Grace MC, Lindy JD, et al. Buffalo Creek survivors in the second decade: comparison with unexposed and nonlitigant groups. *J Appl Soc Psychiatry* 1990;20:1033-1050
- McFarlane AC, Atchison M, Yehuda R. The acute stress response following motor vehicle accidents and its relations to PTSD. *Ann N Y Acad Sci* 1997;821:437-441
- Resnick HS, Yehuda R, Pitman RK, et al. Effect of previous trauma on acute plasma cortisol level following rape. *Am J Psychiatry* 1995;152:1675-1677
- Shalev AY, Sahar T, Freedman S, et al. A prospective study of heart rate responses following trauma and the subsequent development of posttraumatic stress disorder. *Arch Gen Psychiatry* 1998;55:553-559
- Niles BL, Newman E, Fisher L. Obstacles to assessment of PTSD in longitudinal research. In: Shalev AY, Yehuda R, McFarlane AC, eds. *International Handbook of Human Response to Trauma*. New York, NY: Plenum/Kluwer; 2000:213-222
- Green BL, Grace MC, Lindy JD, et al. Risk factors for PTSD and other diagnoses in a general sample of Vietnam veterans. *Am J Psychiatry* 1990;147:729-733
- Engdahl BE, Speed N, Eberly RE, et al. Comorbidity of psychiatric disorders and personality profiles of American World War II prisoners of war. *J Nerv Ment Dis* 1991;179:181-187
- McFarlane AC, Papay P. Multiple diagnoses in posttraumatic stress disorder in the victims of a natural disaster. *J Nerv Ment Dis* 1992;180:498-504
- Ramsay R, Gorst-Unsworth C, Turner S. Psychiatric morbidity in survivors of organised state violence including torture: a retrospective series. *Br J Psychiatry* 1993;162:55-59
- North CS, Smith EM, Spitznagel EL. Posttraumatic stress disorder in survivors of a mass shooting. *Am J Psychiatry* 1994;151:82-88
- Blanchard EB, Hickling EJ, Taylor AE, et al. Who develops PTSD from motor vehicle accidents? *Behav Res Ther* 1996;34:1-10
- Kessler RC, Sonnega A, Bromet E, et al. Post-traumatic stress disorder in the National Comorbidity Survey. *Arch Gen Psychiatry* 1995;52:1048-1060
- Dew MA, Roth LH, Schulberg HC, et al. Prevalence and predictors of depression and anxiety-related disorders during the year after heart transplantation. *Gen Hosp Psychiatry* 1996;18(suppl 6):48S-61S
- Bleich A, Koslowsky M, Dolev A, et al. Post-traumatic stress disorder and depression. *Br J Psychiatry* 1997;170:479-482
- Shalev AY, Freedman S, Peri T, et al. Prospective study of posttraumatic stress disorder and depression following trauma. *Am J Psychiatry* 1998;155:630-637
- Solomon Z, Mikulincer M, Kotler M. A two-year follow-up of somatic complaints among Israeli combat stress reaction casualties. *J Psychosom Res* 1987;31:463-469
- Roth LM. Substance use and mental health among Vietnam veterans. In: Boulanger G, Kadushin C, eds. *The Vietnam Veteran Redefined*. Hillsdale, NJ: Lawrence Erlbaum; 1986:61-78
- Goenjian A. A mental health relief programme in Armenia after the 1988 earthquake: implementation and clinical observations. *Br J Psychiatry* 1993;163:230-239
- Joseph S, Yule W, Williams R, et al. Increased substance use in survivors of the Herald of Free Enterprise disaster. *Br J Med Psychol* 1993;66:185-191
- Melick ME. Life change and illness: illness behavior of males in the recovery period of a natural disaster. *J Health Soc Behav* 1978;19:335-342
- Logue JN, Hansen H, Struening E. Emotional and physical distress following Hurricane Agnes in Wyoming Valley of Pennsylvania. *Public Health Rep* 1979;4:495-502
- McFarlane AC. Family functioning and overprotection following a natural disaster: the longitudinal effects of post-traumatic morbidity. *Aust N Z J Psychiatry* 1987;21:210-218

38. Watson CG. Psychometric posttraumatic stress disorder measurement techniques: a review. *Psychol Assess* 1990;2:460-469
39. Blake DD, Weather FW, Nagy LM, et al. A clinician rating scale for assessing current and lifetime PTSD: the CAPS-I. *Behav Ther* 1990;13:187-188
40. Horowitz M, Wilner N, Alvarez W. Impact of Event Scale: a measure of subjective stress. *Psychosom Med* 1979;41:209-218
41. Orr SP, Solomon Z, Peri T, et al. Physiologic responses to loud tones in Israeli veterans of the 1973 Yom Kippur War. *Biol Psychiatry* 1997;41:319-326
42. Shalev AY, Orr SP, Peri T, et al. Physiologic responses to loud tones in Israeli patients with posttraumatic stress disorder. *Arch Gen Psychiatry* 1992;49:870-875
43. Bleich A, Siegel B, Garb R, et al. Post-traumatic stress disorder following combat exposure: clinical features and psychopharmacological treatment. *Br J Psychiatry* 1986;149:354-369
44. Frank JB, Kosten TR, Giller EL, et al. A randomized clinical trial of phenelzine and imipramine for posttraumatic stress disorder. *Am J Psychiatry* 1988;145:1289-1291
45. Davidson JR, Kudler H, Smith R, et al. Treatment of post-traumatic stress disorder with amitriptyline and placebo. *Arch Gen Psychiatry* 1990;47:259-266
46. van der Kolk BA, Dryfuss D, Michaels M, et al. Fluoxetine in posttraumatic stress disorder. *J Clin Psychiatry* 1994;55:517-522
47. Loewenstein RJ, Hornstein N, Farber B. Open trial of clonazepam in the treatment of posttraumatic stress symptoms in MPD. *Dissociation* 1988;1:3-12
48. Braun P, Greenberg D, Dasberg H, et al. Core symptoms of posttraumatic stress disorder unimproved by alprazolam treatment. *Br J Psychiatry* 1990;51:236-238
49. Risse SC, Whitters A, Burke J, et al. Severe withdrawal symptoms after discontinuation of alprazolam in eight patients with combat-induced posttraumatic stress disorder. *J Clin Psychiatry* 1990;51:206-209
50. Kitchner I, Greenstein R. Low dose lithium carbonate in the treatment of post traumatic stress disorder; brief communication. *Mil Med* 1985;150:378-381
51. Fesler FA. Valproate in combat-related posttraumatic stress disorder. *J Clin Psychiatry* 1991;52:361-364
52. Lipper S, Davidson JRT, Grady TA, et al. Preliminary study of carbamazepine in posttraumatic stress disorder. *Psychosomatics* 1986;72:849-854
53. Wolf ME, Alavi A, Mosnaim AD. Pharmacological interventions in Vietnam veterans with post traumatic stress disorder. *Res Community Psychol Psychiatry Behav* 1987;12:169-176
54. Yehuda R. Biology of posttraumatic stress disorder. *J Clin Psychiatry* 2001;62(suppl 17):41-46
55. Berlant JL. Topiramate in posttraumatic stress disorder: preliminary clinical observations. *J Clin Psychiatry* 2001;62(suppl 17):60-63