

Post-traumatic stress disorder symptoms in healthcare workers: a ten-year systematic review

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Summary. *Background and aims:* Healthcare workers (HCWs) employed in hospital settings frequently experience many occupational stressors leading to post-traumatic stress disorder (PTSD) symptoms. Literature has increasingly highlighted PTSD as a major issue that involves both staff and healthcare organizations; the consequences of PTSD may include medication errors and lower standards of care. The current COVID-19 pandemic poses the need for preventing PTSD in HCWs working closely with COVID-19 patients. The purpose of this systematic review was to analyze the latest developments in assessing and managing the occupational risk of PTSD symptoms in hospital HCWs. *Methods:* We searched for publications in MEDLINE/Pubmed using selected keywords. Each article was reviewed and categorized into one or more of the following four categories based on its subject matter: risk assessment, risk management and occurrence rates. *Results:* Our search resulted in a total of 32 publications that matched our inclusion criteria. Increased years of service, older age, previous year exposure to violence, personality traits (i.e. neuroticism), history of mental disorders, being non-graduates, were found to be workers' pre-trauma factors predicting PTSD symptoms. *Conclusions:* The findings suggest the need to prioritize preventative interventions aimed to anticipate the effects of traumatic exposure by training HCWs in evidence based anticipatory methods of coping with stressful events. With regard to the current COVID-19 pandemic, we found evidence of the need to strength social support and training targeted at psychological skills of medical staff who treated COVID-19 patients. (www.actabiomedica.it)

Keywords: Post-traumatic stress disorder, healthcare work, risk assessment, risk management, Covid-19

Introduction

Prevention of work-related post-traumatic stress disorder (PTSD) symptoms in hospital settings represents a global concern for both organizations and healthcare workers (HCWs), as HCWs are likely to experience many acute and chronic, often unpredictable, occupational stressors (e.g. sudden death, managing critical trauma cases, dealing with patients with great potential for violent behavior) leading to PTSD symptoms (1-4). A relationship has been found between PTSD affecting HCWs and poor quality of care; in fact it has been reported that PTSD can lead

HCWs to experiencing compassion fatigue (5), reduced productivity (6), burnout (7) and increased risk of patient falls, medication errors, and, consequently, overall lower quality of care (8). Moreover, a study of Hamama-Raz et al. (9) found that HCWs facing high risk of PTSD incurred an increased risk of depression which in turn may be considered as a complication of PTSD and its impairment. This finding is in line with existing literature that showed substantial proportions (between 21% and 94%) of hospital personnel suffering from PTSD symptoms also suffering from comorbid depression (10,11). Co-morbidity with depression may work bi-directionally, both as a possible

pre-existing mediator for PTSD and also as a consequence or indirect effect of PTSD (12).

A recent study conducted in January and February 2020 in Chinese hospital settings for patient affected by Coronavirus disease 2019 (COVID-19, formerly known as severe acute respiratory syndrome coronavirus 2 [SARS-CoV-2]), showed increased levels of anxiety, stress, and self-efficacy, in clinical first-line medical staff in COVID-19 pandemic, and highlighted the need for interventions to prevent PTSD in such HCWs (13).

According to ICD-10, PTSD typically involves symptoms that can be classified into three groups: 1) intrusion – recurrent images, dreams or memories related to the traumatic experience; 2) avoidance – of places, people or topics related to the traumatic experience, accompanied by a general decrease in activity; 3) arousal – understood as increased psycho-physiological reactivity in the form of attention deficit disorders, circadian rhythm disorders, or increased vigilance (14). In 2013 the DSM-5 (15) encoded important changes for what concern post-traumatic stress conditions, particularly PTSD. Besides changes in the symptomatologic diagnostic criteria, the current edition of the DSM better specified Criterion A about the trauma, eliminating the need of person's response to the event involving intense fear, helplessness, or horror (criterion A2) and better clarifying the characteristics of the potentially traumatic experiences including, for the first time, a repeated or extreme indirect exposure to aversive details of the event(s), usually in the course of professional duties (e.g., first responders, collecting body parts; professionals repeatedly exposed to details of child abuse) (criterion A4).

By literature, the experience of traumatic stress does not represent the unique factor in itself conditioning the development of PTSD symptoms. Since epidemiological studies indicate that PTSD develops in a relatively small percentage of people exposed to stress at traumatic levels, other risk factors should be considered for PTSD, apart from the experience of stress itself (12) and, consequently, the prevention of PTSD in hospital settings should be focused on the recent findings of literature regarding the assessment and management of work-related PTSD in healthcare sector.

Aims

The present review was aimed to analyze the most recent developments in assessing and managing the occupational risk of PTSD symptoms in HCWs employed in hospital settings, in the last ten years.

Materials and Methods

Search strategy

A systematic review of literature from January 2010 to March 15, 2020 regarding the PTSD symptoms in HCWs employed in hospital settings was conducted. The general methods and selection criteria were based on different sources. First, two major electronic databases (MEDLINE/Pubmed); second, the reference sections of the identified studies were scanned for additional relevant studies satisfying the criteria. Selected keywords were used to identify articles for this review of literature. The keywords were: Post Traumatic Stress Disorder, SPTD, Healthcare Worker, Hospital, Assessment, Management, Occurrence. The keywords were systematically combined in order to conduct the literature search. For example, "PTSD" AND "Healthcare Worker" AND "Hospital" was one combination. We aimed to identify original research articles (i.e. non-reviews) using the above-mentioned keywords with the following inclusion criteria: 1) full reports; 2) written in English; 3) published from January 2010 to March 15, 2020 and 4) indexed in MEDLINE/Pubmed. The exclusion criteria were: 1) non-human studies; 2) studies that were not peer-reviewed and 3) commentaries, case series, case reports, review articles, letters to the editors.

Data extraction

The screening of articles was carried out in two phases. In the first phase, articles were screened on the basis of title and abstract. The abstracts of all the selected titles were sorted for more detailed information. Two independent reviewers (G.D. and V.P.) read the abstracts and categorized them as relevant, not relevant, or possibly relevant. In the second phase, the

full-text articles were assessed for eligibility. Two reviewers (G.D. and V.P.) independently applied inclusion and exclusion criteria to potentially eligible papers and both reviewers then independently extracted data from the original articles. Any disagreements were independently checked by the second reviewer (G.C.) and a consensus was reached.

Categorization of selected articles

Every full-text article that met the inclusion criteria was reviewed and categorized into one or more of the following three categories based on its subject: risk assessment (articles aimed at the identification of occupational risk factors for PTSD symptoms), risk management (articles focused on occupational interventions for reducing the likelihood of PTSD symptoms occurrence), and occurrence rates (e.g. incidence or prevalence of PTSD symptoms among in-hospital HCWs). This systematic review was reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement (16).

Results

Several studies investigated the hospital settings as risk factors for PTSD symptoms in HCWs. Our search of literature resulted in a total of 48 publications that matched our inclusion criteria. Sixteen of these were removed because they were deemed irrelevant (i.e. not concerning hospital HCWs). Therefore, thirty-two papers remained in the study (Table 1). These thirty-two papers were then categorized according to their subject matter. The topics, discussed in order of frequency from highest to lowest, were: occurrence rates, risk assessment, and risk management. All thirty-two papers assessed the occurrence rates of PTSD; 26 articles focused on risk assessment and 11 articles on risk management. Seven papers targeted all three topics, 19 papers studied both risk assessment and on occurrence rates, 4 papers analyzed both risk management and occurrence rates.

Discussion

Risk assessment of work-related PTSD symptoms

Our search of literature found that in the last ten years 26 articles discussed the topic regarding the risk assessment of work-related PTSD symptoms among hospital HCWs, with the aim to identify the risk profile for HCWs who are at risk of developing PTSD. Among the 26 papers 15 were focused on pre-trauma risk factors and analyzed both organizational and individual factors related to the occurrence of PTSD symptoms. Organizational pre-trauma risk factors for PTSD symptoms were detected as follows: heavy workload, poor training on traumatic events in hospital settings, lack of cohesiveness among workers. Interestingly, a study by Joseph et al. (43) found significant increasing in PTSD symptoms risk among trauma surgeons operating more than 15 cases per month (OR, 3; 95% CI, 1.2-8), having more than seven call duties per month (OR, 2.6; 95% CI, 1.2-6), and with less than 4 hours of relaxation per day. These findings allowed the authors to hypothesize a relationship between increased workload and higher risk of developing PTSD symptoms, in line with recent literature (26, 22) which found stressful work conditions positively associated with PTSD (35, 47). In particular, Lee et al. (35) found that work stress relating to organizational and staffing issues might leave HCWs feeling dejected and unvalued due to lack of consultation, lack of collaboration, ongoing staff conflict in the workplace, and, therefore, more susceptible to PTSD symptoms after traumatic episodes. On the contrary, group-oriented culture and cohesiveness among workers were found by Mishra et al. (31) protective factors for PTSD symptoms. With regard to the effectiveness of training for prevention of PTSD, Lee et al. (35) showed that attending courses focused on aggression-management decreased the risk of PTSD symptoms in nurses who experienced workplace violence from in-patients in mental care settings; this finding suggests that staggered and regular training over a period of years gives HCWs repeated opportunities to rehearse aggression-management

Table 1. Summary of literature review findings and article categorization based on addressed topics, methodological approaches and study location

Reference	Study design	Study location	Sample size	Risk assessment	Risk management	Occurrence rates	Tools to assess PTSD
De Lucia et al. 2019 (17)	Cross sectional	United States	526	X	X	X	PTSD Checklist-Civilian Version
Somville et al. 2010 (18)	Cross sectional	Belgium	152	X	X	X	Impact of Event scale
Shi al. 2017 (19)	Cross sectional	China	2706	X	X	X	PTSD Checklist-Civilian Version
Carmassi et al. 2016 (20)	Cross sectional	Italy	110	X		X	TALS-SR
Carmassi et al. 2018 (21)	Cross sectional	Italy	42		X	X	TALS-SR
Baas et al. 2018 (22)	Cross sectional	Germany	683		X	X	Trauma Screening Questionnaire
Shamia et al. 2015 (23)	Cross sectional	Palestine	274	X	X	X	Posttraumatic Stress Disorder Checklist
Pajonk et al. 2012 (24)	Cross sectional	Germany	487	X		X	Posttraumatic Stress Scale, Posttraumatic Diagnostic Scale, and the Impact of Event Scale,
Jacobowitz et al. 2015 (25)	Cross sectional	United States	172	X		X	
Luftman et al. 2017 (26)	Cross sectional	United States	546			X	Primary Care PTSD Screen
Colville et al. 2017 (27)	Cross sectional	United Kingdom	377	X		X	TSQ
Hilton et al. 2017 (28)	Cross sectional	Canada	219	X		X	PTSD Checklist
Lavoie et al. 2011 (29)	Cross sectional	Canada	12	X		X	Semi-structured interviews
Lavoie et al. 2016 (30)	Cross sectional	Canada	35	X		X	PTSD Checklist
Mishra et al. 2010 (31)	Cross sectional	United States	105	X	X	X	PTSD Checklist
Adriaenssens et al. 2012 (32)	Cross sectional	Belgium	248	X	X	X	Impact of Event scale
Hosseininejad et al. 2019 (33)	Cross sectional	Iran	131		X	X	Civilian Mississippi scale for PTSD
Iranmanesh et al. 2013 (34)	Cross sectional	Iran	400		X	X	Mississippi scale for post-traumatic stress disorder

(Continued)

Table 1. (Continued)

Lee et al. 2015 (35)	Cross sectional	Australia	196	X	X	X	PTSD Checklist
Naghavi et al. 2013 (36)	Cross sectional	United Kingdom	147	X		X	Impact of Event Scale-revised
Hamama-Raz et al. 2016 (9)	Cross sectional	Israel	125	X		X	Impact of Event Scale-revised
Wahlberg et al. 2016 (38)	Cross sectional	Sweden	2165	X		X	Screen Questionnaire Post-traumatic Stress Disorder
Czaja et al. 2012 (7)	Cross sectional	United States	173	X		X	Post-traumatic Diagnostic Scale
van Steijn et al. 2019 (39)	Cross sectional	The Netherlands	410	X		X	Trauma Screening Questionnaire
Nogalski et al. 2018 (40)	Cross sectional	Poland	159	X		X	Impact of Event Scale – Revised – IES–R
Fjeldheim et al. 2014 (12)	Cross sectional	South Africa	132	X		X	Davidson Trauma Scale
Wild et al. 2016 (41)	Longitudinal	United Kingdom	386	X		X	Structured Clinical Interview for the Diagnostic and Statistical Manual of Mental Disorders, fourth edition (DSM-IV)
Olashore et al. 2018 (42)	Cross sectional	Botswana	201	X		X	PTSD Checklist Civilian
Joseph et al. 2014 (43)	Cross Sectional	United States	453	X		X	PTSD Checklist Civilian
Zafar et al. 2016 (44)	Cross sectional	Pakistan	179	X		X	PTSD Checklist
Ruitenbunrg et al. 2012 (45)	Cross sectional	The Netherlands	458			X	Dutch version of the Impact of Event Scale
Huang et al. 2020 (46)	Cross sectional	China	230	X		X	Post-Traumatic Stress Disorder Self-rating Scale

skills, thereby improving confidence and minimizing the psychic sequel of such traumatic episodes. Surprisingly, having attended a course recently was found a predictor of PTSD symptoms; based on this finding,

the authors hypothesized that when nurses attend or have just attended a course where the prevalence, cause, and management of inpatient aggression is discussed, they might become primed to expect aggression, and

become more aroused in the short term and, consequently, the risk for developing PTSD symptoms following an in-patient aggression is increased.

Individual pre-trauma factors predicting PTSD symptoms were detected by the selected papers as following: increased years of service, older age (>40), previous year exposure to violence, personality traits (i.e. neuroticism), history of mental disorders, being non-graduates. In a cross-sectional study, Hamama-Raz et al. (9) found a relationship between PTSD symptoms and both age and length of service; based on these findings, the authors hypothesized that stressful experiences, including workplace violence, in hospital settings are more likely to be recurring, and therefore, may contribute to the development of PTSD in a vulnerable population over time; therefore, this potential cumulative effect may explain why HCWs with PTSD symptoms were frequently older with more years of service rather than a young, inexperienced HCW. Moreover, Carmassi et al. (20, 21) speculated that most likely older subjects reported the lower education levels compared to younger HCWs; in accordance with existing literature (48, 49), training and professional education protect workers from PTSD, in fact, the more professional education is heightened the more resilient coping strategy increases.

With regard to personality traits, neuroticism was found a predictor of PTSD in HCWs; in accordance with the findings of Engelhard et al. (50), many studies revealed that workers with high neuroticism score incurred a higher risk of developing PTSD symptoms compared to the general population (29,30,42). These findings are in line with a study conducted in non-hospital healthcare settings and involving Dutch pre-hospital emergency doctors, that revealed neuroticism as a predictor for PTSD more than the traumatic experiences; in fact, the authors found highest number of PTSD diagnosis among HCWs reporting high neuroticism scores (anxious cluster) (24).

Papers focused on gender of HCWs suffering from PTSD symptoms did not show accordance: 5 studies found higher risk for PTSD in females, 2 studies in men. It is important to notice that studies exploring the possible confounding role of other risk factors for PTSD, including work-related training and

education, reported gender difference may be lowered when a specific professional training has been performed, as reported among nurses [49], police officers, and fire workers (21). In order to the current COVID-19 pandemic, the study of Huang et al. found a significantly higher incidence of PTSD symptoms in female medical staff compared to male medical staff ($p=0.014$) (46); this finding support the need for further studies aimed to explore the gender susceptibility to PTSD symptoms in HCWs working closely with COVID-19 patients.

With regard to post-traumatic risk factors for PTSD symptoms, 10 papers showed the following factors: lack of social support from managerial staff and colleagues, unavailability of debriefing after traumatic episodes, negative coping, burnout symptoms, depression. The present review found concordance regarding the negative relationship between social support and PTSD symptoms. By literature social support is a known predictor of occupational stress in emergency care workers (18,32) and it is defined as 'the feeling that one is cared for and has assistance available from other people' and 'that one is part of a supportive social network'(18). In the past a Dutch study (24) showed that social support in the workplace was positively related to PTSD occurrence in emergency care personnel. Consistent with this finding many authors (12,51) revealed that the most common type of social support negatively associated with PTSD is emotional support: the more emotional support received from supervisors and colleagues (i.e. acting as a confidant, listening and offering sympathy to the victim of traumatic episode) after a traumatic event, the lower the risk of developing PTSD status for HCW (29,38).

The research performed by Fjeldheim et al. (12) found that depression was a significant predictor of PTSD and had a mediating effect between trauma exposure and PTSD status; in line with this finding other studies of different populations showed that, in most cases, depression was secondary to PTSD (52) which in turn may be considered as a complication of PTSD and its impairment. Moreover, Hamama-Raz et al. (9) showed that an elevated risk of PTSD among obstetric nurses is linked to a higher risk of depressive symptoms, and speculated that an explanation may

be attributed to the intensity of emotions concerning traumatic episodes for the staff. Such intensity can create a complexity of PTSD symptoms that is more often accompanied by another disorder, instead of manifesting alone; based on these findings, the authors suggested a bi-directional relationship between PTSD and depression, both as a possible pre-existing mediator for PTSD and also as a consequence or indirect effect of PTSD.

Risk management of work-related PTSD symptoms

Among the 11 studies focused on this topic, 9 papers discussed the management interventions targeted at the staff, with the aim to improve the social support at work, and two papers focused on the way to minimize the occurrence of PTSD symptoms through occupational training. The papers showed strong concordance on the significant negative association between social support and PTSD symptoms, leading to speculate that a supportive hospital environment (i.e. social network involving management staff and employees) can help individuals cope with a wide range of stressful events and serve as a buffer against their negative health effects. In fact, Shi et al (19) found that among HCWs victims of physical violence in hospital settings, the level of PTSD symptoms was significantly and negatively correlated with the HCWs' scores for objective support and utilization of support. Moreover, Healy et al. (53) proved the effectiveness of leadership style focused on supporting HCWs victims of workplace traumatic events, to minimize the stressful effects; in particular, supportive, communicative, empathic and anticipatory leadership was found effective to establish a supportive culture, with good team spirit and good interpersonal and interdisciplinary communication, oriented to that is geared towards rewarding the workers and demonstrates awareness and concern about the stressful effects of traumatic events. Given these findings, creating a reflective narrative environment, in which HCWs can express their own feelings and experiences about stressful situations, seems to be as an effective approach to minimize the influential factors on PTSD symptoms. Therefore, according with existing literature, hospital management and supervisors need to anticipate the effects of traumatic

exposure, by training HCWs in evidence based anticipatory methods of coping with stressful events, in reducing the development of post-traumatic stress reactions and general distress, in educating health care professionals to support their colleagues after adverse events (54). In addition, as workplace violence has been proved a predictor of PTSD symptoms, a training of HCWs in dealing with violence is indicated; in fact there is evidence that training (learning to anticipate, recognize and respond to violence) and techniques of dealing with aggressive patients, including eliminating solo interventions, may prevent PTSD symptoms in HCWs (31).

Occurrence of work-related PTSD symptoms

All the checked papers focused the present topic, with the aim to assess the relevance of the PTSD in HCWs dealing with traumatic events in hospital settings. The occurrence rates were between 2.2 and 24%; this wide range was related to: 1) different definitions of PTSD and 2) hospital settings investigated. With regard to definition of PTSD, van Stejin et al. (39) observed that rates of PTSD found by observational studies may suffer from differences due to inclusion or not of all criteria established by DSM-5; in fact, the author in his research adopted such full criteria and found a prevalence of PTSD of 2.2%, significantly lower than the ones detected by studies not adopting the criterion A of DSM-5 for diagnosis of PTSD. With regard to the investigated hospital settings, high rates of PTSD were found in Emergency Departments (up to 92%), trauma surgeons (up to 40%) in-hospital psychiatric wards (up to 17%) (35,43). High risk of PTSD symptoms was found in HCWs victims of workplace violence in hospital settings; a cross-sectional study by Shi et al. [19] found that 20% of HCWs who experienced workplace violence in hospital settings suffered from PTSD symptoms; moreover, Richter and Berger (55) found that, up to 6 months after the assault, approximately 10% of assaulted victims suffered from post-traumatic stress, women had significantly higher stress symptoms than men, and post-traumatic stress had no dose response relation with the severity of physical damage caused by the assault in the weeks following the incident.

With regard to the COVID-19 pandemic, the study of Huang et al. (46) found that 27.39% of medical staff was affected from PTSD symptoms, and females reported higher scores of Post-Traumatic Stress Disorder Self-rating Scale (PTSD-SS) than males [(44.30±18.42) vs (36.91 ± 13.95), $t=-2.472$, $P=0.014$]. Further studies are required to assess occurrence and workers' susceptibility to PTSD symptoms in HCWs engaged in the treatment of COVID-19 patients.

Conclusion

The findings of the present review highlight the PTSD as a major concern for both HCWs and health-care organizations. Significantly higher prevalence of PTSD symptoms has been found among HCWs compared to adult general population, worldwide, particularly in emergency departments, psychiatric wards and trauma surgery departments. Occupational interventions aimed to minimize the risk of PTSD should be focused on: 1) the organizational level predictors of PTSD: heavy workload, poor training on traumatic events in hospital settings, lack of cohesiveness among workers, workplace violence, lack of social support from management and colleagues; 2) workers' vulnerabilities: older age, length of service, negative coping, neuroticism; 3) counseling for HCWs who experienced traumatic events, including debriefing. According with existing literature, hospital management and supervisors should anticipate the effects of traumatic exposure by training HCWs in evidence based anticipatory methods of coping with stressful events; in fact strong evidence seems to suggest the effectiveness of higher levels of such targeted occupational training to render subjects at lower risk for PTSD. Although the selected papers suffered from differences in the definition of PTSD, and consequently, reported different occurrence rates, a body of concordance was found about increased risk for PTSD in HCWs employed in hospital settings. With regard to the current COVID-19 pandemic, one study highlighted the need to strengthen social support and training targeted at psychological skills of medical staff, as high incidence of PTSD symptoms have been found in medical staff, particularly female doctors, who treated patients

affected by COVID-19. Further studies are required to assess the risk for PTSD in HCWs working closely with COVID-19 patients and, consequently, to detect preventative strategies effective in minimizing the occurrence of work-related PTSD in such workers.

This study suffers from some limitations. The limited number of manuscripts included in this study does not make it possible to draw strong conclusions. The manuscripts included in this study suffer from differences in the criteria adopted for the definition of PTSD and for the analysis of confounders. Thirty-one of the thirty-two included studies were cross-sectional and, consequently, the nature of these studies limited the assessment of temporality and were therefore unable to establish a causal relationship between health-care work in hospital settings and PTSD symptoms.

Conflict of interest: Each author declares that he or she has no commercial associations (e.g. consultancies, stock ownership, equity interest, patent/licensing arrangement etc.) that might pose a conflict of interest in connection with the submitted article

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