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BRIEF REPORT

World Trade Center psychological exposures and trauma related disorders: PTSD and adjustment disorders

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ABSTRACT

The relationship between exposure to the World Trade Center (WTC) disaster and elevated rates of trauma related psychiatric illnesses in 9/11 responders and survivors has been well documented. This paper is part of a series to promote the practice of evidence-based medicine when managing persons with WTC-related conditions and focuses on "Trauma and Stressor Related Disorders," a diagnostic category that includes posttraumatic stress disorder (PTSD) and adjustment disorder. It offers background on 9/11-related trauma exposure, a summary of research findings from this cohort, and is followed by brief diagnostic and treatment information from selected clinical practice guidelines.

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Introduction

Responders and community members in lower Manhattan, the Pentagon and Shanksville, PA, witnessed horrific events on September 11, 2001, including the sudden death of friends, coworkers, bystanders, and family. In lower Manhattan, thousands were injured and feared their death as they evacuated the World Trade Center (WTC) towers or were caught in the toxic dust cloud as the towers collapsed. Residents, students, occupants of the WTC towers and nearby buildings ("survivors"), and rescue, recovery, and restoration workers ("responders") were exposed to environmental toxins and psychologically disturbing scenes on 9/11 and in the aftermath of the attacks. Responders in New York City included many workers not traditionally associated with emergency response such as construction workers, iron cutters, asbestos removers, electricians, and workers who participated in general clean-up of the disaster site. Most of these "non-traditional" responders were not trained in disaster work and many were assigned to disturbing tasks that were outside of their normal occupational duties such as handling bodies and human remains.[1,2] Area workers, residents, and students were displaced from their homes or jobs in lower Manhattan and many experienced subsequent economic hardships. Those who remained in the area were exposed to constant reminders of the terror, death, and destruction. While acute stress-related symptoms abated quickly for most individuals who experienced 9/11 exposure, for many others, the trauma of September 11 caused or exacerbated psychiatric disorders and led to enduring health consequences.

This is the one in a series of articles devoted to promoting the practice of high quality, evidence-based medicine when diagnosing and treating persons with conditions associated with 9/11 exposure [see Calvert et al.[3] for background details]. This paper focuses on "Trauma and Stressor Related Disorders," a diagnostic category for conditions whose onset is precipitated by exposure to a specific stressful and potentially traumatic event[4] and includes posttraumatic stress disorder (PTSD) and adjustment disorder (AD). These disorders differ in several ways, including the type of precipitating event, and the duration and pattern of symptoms. Ongoing clinical surveillance for these conditions is critical due to the considerable morbidity in affected individuals compared to the general population, including increased rates of psychiatric illness,

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suicidal behavior, substance misuse, and medical illness.[5]

The World Trade Center Health Program (WTCHP) is a limited federal health program that provides no-cost medical monitoring and treatment for WTC exposure-related health conditions to those directly affected by the 9/11 attacks (https://www.cdc.gov/wtc/about.html). Patients who present with conditions that do not meet criteria for program enrollment such as non-WTC related occupational conditions or injuries, or who need evaluation or services for related disabilities are provided with appropriate referrals (e.g., New York State Workers' Compensation system).

9/11 traumatic exposure and psychological sequelae

Exposure to traumatic events is a known risk factor for the development of several psychiatric disorders and may aggravate preexisting conditions. For 9/11 responders and survivors, the combined exposure to both terrorism and environmental disaster has deeply influenced the nature, complexity, and persistence of subsequent related health issues. Considerable research has documented a relationship between WTC disaster exposure and elevated rates of psychiatric illness including PTSD, depression, anxiety disorders, and substance use disorders.[6,7] These conditions often precipitate loss of economic and social resources (e.g., unemployment, ruptured relationships) and result in significant functional impairment. Comorbid PTSD and depression, particularly for individuals directly and highly exposed to the events of 9/11, has been associated with poorer outcomes on measures of employment, social integration, and quality of life compared to those with no psychiatric morbidity.[8] Responders with PTSD and comorbid chronic physical health conditions are more likely to experience premature labor force exit and income and job loss before age 60 compared to those diagnosed with physical or medical conditions alone.[9]

Role of the primary care provider

The prevalence of psychiatric conditions many years after September 11th warrants continued mental health screenings and treatment for those affected by exposure. Primary care and non-specialist providers serve a key role in the evaluation, treatment, and referral of individuals who report 9/11 exposure and present with psychiatric symptoms. Clinicians should obtain a detailed exposure history and inquire about specific factors that increase the likelihood of developing WTC-related psychiatric disorders (see Table 1 for examples of common risk factors). Consider referring patients to a mental health professional when there is diagnostic uncertainty, concern of suicide, or in the presence of comorbid substance use disorder.

Psychiatric conditions and treatment

Posttraumatic stress disorder

PTSD is a serious, often debilitating disorder that may develop in individuals exposed to actual or threatened death, serious injury or sexual violence.[10]

It is characterized by:

- intrusive, involuntary recurring thoughts or images of the traumatic event
- persistent avoidance of stimuli associated with the event
- negative changes in cognitions and mood
- marked change in state of arousal and reactivity

While PTSD is the most diagnosed psychiatric condition in the 9/11 affected cohort, the prevalence varies substantially within the cohort subgroups[11] and is significantly higher among those who performed tasks not common for their occupation.[12] In the survivor cohort, Hispanic ethnicity, low income, having a high school education or less, exposure to the WTC dust cloud and comorbid lower respiratory and mental health symptoms have been identified as risk factors for PTSD.[13] A large study among rescue and recovery workers enrolled in the WTC Health Registry conducted between September 2003 and November 2004, found that the overall prevalence of PTSD was 12.4%, ranging from 6.2% for police to 21.2% for unaffiliated volunteers.[12] A recent study of responders[14] found that 12 years after 9/11, the point prevalence of probable PTSD[1] in police responders was 9.3% and that of subthreshold PTSD was 17.5%. In contrast, the prevalence for nontraditional responders was significantly higher: 21.9% for probable PTSD and 24.1% for subthreshold PTSD.

The trajectory of 9/11-related PTSD symptoms varies, and ranges from full or partial recovery to severe symptoms that persist or even worsen over time. Prior psychiatric history, severity of WTC exposure, Hispanic ethnicity, post-9/11 traumas, maladaptive coping (e.g., substance use, avoidance behaviors) and presence of WTC-related medical conditions are most strongly associated with a trajectory of

Table 1. Risk Factors Associated with Developing WTC-Related Psychiatric Disorders.[9,22].

- Experiencing WTC-related exposures at home, work, or school; in particular, personally witnessing events on 9/11 that induced horror, including:
  - Airplanes hitting the towers
  - Buildings collapsing
  - Friends, relatives, or colleagues getting injured or killed
  - People falling or jumping from the towers
- Working as part of the 9/11 rescue, recovery, restoration, or clean-up operations
- Performing 9/11 response work that was not common for occupation or without prior training
- Exposure to the dust cloud
- Sustaining an injury at the WTC site
- Experiencing WTC-related physical health problems (e.g., exposure related lower respiratory symptoms)
- Experiencing loss of job, medical benefits, or financial difficulties because of WTC-related illness

chronically elevated symptoms in the responder population.[15] In a study of the survivor population,[13] Hispanic ethnicity and comorbid depression were associated with persistence of PTSD symptoms. Populations with a history of trauma may be more vulnerable to adverse psychological consequences when experiencing subsequent traumatic exposure,[16] and is another factor contributing to enduring trauma symptoms. Exacerbation of psychiatric symptoms in 9/11 survivors and responders has been noted following natural disasters,[17] during the first year of the COVID-19 pandemic in New York,[18] and an increase in distress around the anniversary of 9/11, referred to as an "anniversary reaction," is commonly reported by 9/11 trauma exposed individuals[2]. Finally, PTSD arising from 9/11 exposures may also be contributing to adverse effects on cognition. This is supported by recent findings of an increased prevalence of mild cognitive impairment among 9/11 responders and survivors with chronic PTSD[19] and is consistent with findings from other studies of individuals diagnosed with PTSD.[18] undefined

Clinical practice guidelines recommend use of a standard PTSD self-report measure such as the PTSD Checklist for Civilians (PCL-C) to assist with screening: https://www.ptsd.va.gov/professional/assessment/documents/APCLC.pdf.

For the full PTSD diagnostic criteria, refer to: https://www.ptsd.va.gov/professional/treat/essentials/dsm5_ptsd.asp#one

Subthreshold PTSD

Subthreshold PTSD is best understood as a reaction to a traumatic event in which the individual has some, but not all, of the symptoms required for a diagnosis of PTSD. These individuals commonly experience significant distress and long-lasting functional impairment related to specific sets of symptoms, most notably hypervigilance and avoidance.[20,21] Anxiety disorder not otherwise specified (NOS) is a diagnostic category retained from the 4th edition of DSM[22] (DSM-IV, 1994) that is often used by clinics participating in the WTCHP to diagnose subthreshold PTSD for program certification purposes. When using DSM-5, Anxiety Disorder NOS is replaced by the "Other Specified Trauma and Stressor-Related Disorder" category.

PTSD treatment

PTSD is a complex disorder that is challenging to treat and may become chronic. Comorbid depression, substance use disorders, and anxiety disorders are found at relatively high rates,[23] complicating treatment. Effective treatments are available, although most require referral to a mental health professional. Trauma-focused psychotherapy, especially cognitive behavioral therapy, has the strongest evidence base and is considered a first line treatment. Pharmacotherapy with selective serotonin reuptake inhibitors (SSRIs) and other agents is also effective at targeting specific symptoms as well as comorbid disorders.

The American Psychological Association (APA) approved a policy statement detailing Evidence-Based Practice as "the integration of the best available research with clinical expertise in the context of patient characteristics, culture and preferences" (APA, 2006, p. 280). Accordingly, two guidelines were selected to inform the care of the demographically and economically diverse 9/11-exposed cohort: community members (some of whom were children on 9/11), traditional responders, civilian workers, and military personnel.[3]

Clinical practice guidelines (CPG) that provide best practices for management of PTSD:

- American Psychological Association (APA) CPG for the Treatment of Posttraumatic Stress Disorder https://www.apa.org/ptsd-guideline/ptsd.pdf

- Management of Posttraumatic Stress Disorder and Acute Stress Reaction 2017 - VA/DoD Clinical Practice Guidelines https://www.healthquality.va.gov/guidelines/MH/ptsd/

The APA guidelines were developed for a civilian population; the VA/DoD guidelines were developed for patients who are Veterans or Service Members and have robust recommendations regarding psychopharmacology. Due to a lack of eligible studies, neither guideline offers specific recommendations for the treatment of subthreshold PTSD. Providers should select those guidelines which best match the patient's background, needs and treatment setting.

Adjustment disorders

Adjustment disorders (ADs), like PTSD, are trauma and stressor related disorders. They are characterized by the development of clinically significant emotional or behavioral symptoms in response to an identifiable stressor occurring within 3 months of the onset of the stressor (DSM-5, 2013). Additional criteria for diagnosis include:

- Marked distress that is out of proportion to the severity or intensity of the stressor
- Significant impairment in social, occupational, or other major areas of functioning
- Once the stressor or its consequences have terminated, symptoms do not persist for more than an additional 6 months. If the disturbance lasts for 6 months or longer, the condition is then considered chronic AD.

Brief instruments to screen for AD are available for use in clinical practice.[24]

Diagnosis of AD requires the identification of a precipitating stressor, however unlike PTSD, the criteria do not specify requirements for what can be regarded as a stressor. The event may include indirect trauma exposure, interpersonal conflict, death of a loved one, unemployment, or serious illness. ADs vary in degree of severity, result in social and occupational impairment, and may also be associated with serious outcomes including subsequent psychiatric diagnoses, increased all-cause mortality, and suicide.[25]

Some 9/11 exposed individuals were diagnosed with adjustment disorder with (AD) in the months following 9/11 exposure. Due to the requirement that symptoms occur within three-months of the stressor onset, it is no longer possible to diagnose AD as a consequence of direct exposure to events in 2001. However, AD is a common diagnosis in medically ill populations[26] including those in oncological and palliative-care settings.[27] Current WTCHP guidelines limit certification of AD to when the symptoms result from the treatment or progression of a serious WTC-related health condition, such as cancer or chronic pulmonary disease.[11] The persistence and progression of many WTC-associated medical illnesses, complicated by 9/11 associated psychosocial sequelae, often lead to the diagnosis of chronic AD.

Adjustment disorder treatment

Due to a lack of high-quality CPGs and clinical treatment trials, there are no clear treatment recommendations for AD. Nevertheless, when severe, AD requires cautious clinical management and the use of appropriate social, psychological, or pharmacological interventions. Studies appear to support the benefit of psychotherapies aimed at reducing the stressor, improving coping skills, and reinforcing the individual's support systems.[28] Pharmacologic agents may be used to mitigate debilitating symptoms, such as depression, chronic insomnia, anxiety, and panic attacks. To date, there is only one published systematic review of specific treatments for adjustment disorder.[29] Although overall the evidence was of low quality, it suggested positive effects of various pharmacological interventions (e.g., SSRIs) and some psychological treatments including technology assisted cognitive behavioral therapy[30] and psychodynamic therapies.

Program coverage

The World Trade Center Health Program (WTCHP) is a limited federal health program that provides no-cost services for certified WTC exposure-related health conditions to those directly affected by the 9/11 attacks in New York, the Pentagon, and Shanksville, Pennsylvania. To receive certification, a WTCHP physician must attest that 9/11 exposures were substantially likely to have been a significant factor in aggravating, contributing to, or causing the enrolled WTC member's condition. For additional information specific to mental health coverage and resources, refer to the WTCHP Mental Health Resource Webpage www.cdc.gov/wtc/mentalhealth.html.

Conclusion

Exposure to 9/11-related traumatic events is a known risk factor for the development of Trauma and

Stressor Related psychiatric disorders. For many responders and community members, the combined exposure to both terrorism and environmental disaster has deeply influenced the nature, complexity, and persistence of subsequent 9/11-related health issues. Prevalence and trajectory of illness within the cohort varies, and are moderated by preexisting individual factors, severity of exposure, prior disaster training, subsequent trauma, presence of WTC-related medical conditions, and associated psychosocial stressors. The relatively high prevalence of psychiatric conditions many years after September 11th warrants continued mental health screenings and ensuring access to treatment. Primary care providers serve a vital role in the evaluation, treatment, and referral of these individuals.

Notes

1. Probable WTC-related PTSD level (none, subthreshold, or full PTSD) was assessed based on DSM-IV criteria using the PTSD Checklist-Specific Stressor version.

2. For a scoping review of research on WTC related conditions including risk and protective factors, please see: Translational Impacts of World Trade Center Health Program Research: A Mixed Methods Study | RAND

3. Practice guidelines suggested in this paper were identified from the ECRI (Emergency Care Research Institute) Guidelines Trust (https://guidelines.ecri.org/), a compendium of CPGs that meet prespecified inclusion criteria (see Calvert et al., 2023).

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Disclaimer

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention.

Disclosure statement

No potential conflict of interest was reported by the authors.

Institutional review board (IRB) review

This activity did not involve human subjects and therefore did not require IRB review.

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