

COVID-19 AND THE HEALTH CARE WORKFORCE

Behavioral and Psychological Responses
and Evidence-Based Interventions

A Review of Published Evidence



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COVER NOTE

The following research was conducted on behalf of the Clinician Wellbeing Advisory Group (CWAG) convened by the Greater New York Hospital Association (GNYHA). The CWAG is a group of health care leaders from GNYHA member hospitals and health systems committed to advancing clinician wellness and resilience through collaboration, information sharing, and advocacy on regional and national levels. CWAG, which was launched in fall 2019 and has met regularly since April—has focused on supporting the workforce during and after the COVID-19 crisis. Special thanks to Jeffrey Selzer, MD (Northwell Health) and Sharon Kiely, MD (Hartford HealthCare) for providing feedback and guidance on developing this resource.

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EXECUTIVE SUMMARY

The COVID-19 pandemic has significantly strained health care workers, which has serious implications for their mental and emotional well-being. The following review summarizes the current body of evidence related to the psychological and emotional impacts of disasters, particularly on the health care workforce or those engaging in similar work during a disaster. These impacts range from common distress reactions, such as changes in sleep patterns, to behavioral changes, such as increased alcohol consumption, to the development of psychiatric disorders like depression or post-traumatic stress disorder (PTSD). Importantly, the psychological and behavioral effects of responding to a disaster as a member of the health care workforce are likely heterogenous, and therefore we present evidence related to characteristics that could be associated with either predisposition to negative emotional and psychological effects or resilience. Lastly, we summarize the evidence investigating the effectiveness of common interventions.

To investigate the topics discussed above, we conducted a rapid review of both peer-reviewed and “gray” literature. Where possible, we relied on previous reviews conducted by experts. The following reviews were particularly helpful and guided our research:

- [Ecological Disasters and Mental Health: Causes, Consequences, and Interventions](#)
- [First Responders: Mental Health Consequences of Natural and Human-Made Disasters for Public Health and Public Safety Workers](#)
- [Psychological Resilience and Post-Traumatic Growth](#)
- [The Psychological Impact of COVID-19 and Other Viral Epidemics on Frontline Healthcare Workers and Ways to Address it: A Rapid Systematic Review](#)
- [The Psychological Impact of Epidemic and Pandemic Outbreaks on Healthcare Workers: Rapid Review of the Evidence](#)
- [Addressing Post-Pandemic Clinician Mental Health: A Narrative Review and Conceptual Framework](#)
- [Mental Health Services for Infectious Disease Outbreaks Including COVID-19: A Rapid Systematic Review](#)

Based on the reviewed evidence, the health care workforce’s potential behavioral and psychological responses to the COVID-19 pandemic include moral injury, health risk behaviors, common distress reactions, and development of psychiatric disorders, such as depression, anxiety, and PTSD.

Moral injury—which refers to psychological distress that results from violating one’s moral or ethical code through action or inaction—has been observed among those working in the health care setting when exposed to trauma. While the evidence base is limited, moral injury has been observed among health care workers when exposed to trauma for which they felt unprepared, when they felt a lack of support from management, or when they felt they were not given the necessary resources. This may be of particular concern in the COVID-19 pandemic as both equipment shortages and staff redeployment were a reality.

Evidence from the general population, disaster response workers, and military personnel indicates that an increase in health risk behaviors may occur due to the trauma experienced by a member of the health care workforce responding to the COVID-19 pandemic. Potential health risk behaviors include addictive behavior, such as the consumption of drugs and alcohol. Increased prevalence of distress responses, such as sleep disturbances, anxiety, and perceived stress also can be expected and have been observed in early evidence generated during the pandemic.

Evidence from the military and workers in health care, emergency services, and disaster response signals there is a potential to develop psychiatric disorders in response to the trauma associated with disaster response. The body of evidence from the military also signals that there is a dose-response relationship between exposure to traumatic events (i.e., the length of military deployment) and prevalence of psychiatric disorders. Some research on previous infectious disease outbreaks also demonstrates that such events may result in a higher prevalence in psychiatric disorders for health care workers, though evidence on the subject is mixed. Several studies have highlighted the potential for psychiatric disorders among health care workers due in part to their proximity to the disease and how members of their community treat them (e.g., ostracization and stigmatization).

Several factors were found to be associated with either an increased likelihood of experiencing negative behavioral or psychological effects or resilience to those effects. Most prominent in the literature were measures of social support or social cohesion, including support from colleagues, family members, or community members. In most cases, the lack of such support was associated with negative psychological or behavioral outcomes while higher levels of support appear to promote resilience. Training and perceived competence also may build resilience to adverse behavioral or psychological outcomes. Importantly, this relationship has been demonstrated after previous infectious disease outbreaks, where the perception of better infection control training had a protective effect.

Potential interventions ranged from psychological first aid (PFA) to behavioral techniques to psychosocial interventions. While PFA has become a prominent framework for supporting communities after a disaster, existing guidelines for its application vary in their empirical basis and there is very little empirical evidence of its effectiveness. Most research is on psychosocial interventions. The most prominent psychosocial interventions in the research appear to be individual psychological debriefing, critical incident stress debriefing (CISD), and trauma risk management. In all cases, the evidence on effectiveness is mixed, and in the case of individual psychological debriefing, there is evidence that such interventions may cause additional harm.

While significant research exists examining the psychological and behavioral responses to disasters, there is significantly less research examining the effectiveness of interventions. In all cases, the quality of the evidence varies widely. The following pages detail the findings of the research summarized above.

INTRODUCTION

The COVID-19 pandemic has significantly strained those working in health care, which has serious implications for the health care workforce's mental and emotional well-being. The psychological and behavioral responses to disaster vary and may include any combination of distress reactions, health risk behaviors, and psychiatric disorders. Counterbalancing these negative responses are each individual's level of resilience.¹

The following summarizes the evidence on the psychological impact of disasters focusing on the health care workforce's psychological and emotional impact. We also summarize the evidence on both risk factors that may predispose individuals to various negative psychological and emotional responses and important factors that may build resilience or lead to post-traumatic growth. Lastly, we summarize the evidence of the effectiveness of several common interventions focusing on those applied in the post-disaster setting.

POTENTIAL PSYCHOLOGICAL AND BEHAVIORAL RESPONSES TO DISASTERS

Following a disaster, most individuals do well and recover to their baseline level of functioning. Some may experience an increased sense to care for themselves and feel more capable handling future adversities. This phenomenon is often termed “post-traumatic growth.” However, a sizable minority will experience one or more adverse psychological and or behavioral responses,¹ including moral injury, health risk behaviors, common distress reactions, and the potential development of psychiatric disorders, such as depression, anxiety, and PTSD. Preti et al. reviewed the literature on the psychological impact of epidemics and pandemic outbreaks, including COVID-19, on health care workers. The authors found that across the reviewed literature:

- The percentage of health care workers reporting post-traumatic stress symptoms during outbreaks ranged from 11% to 73%. Between 10% and 40% of these individuals still reported symptoms at least one year later.
- The percentage of health care workers reporting depressive symptoms during outbreaks ranged from 28% to 51%
- The percentage of health care workers reporting insomnia symptoms during outbreaks ranged from 34% to 36%
- The percentage of health care workers reporting severe anxiety symptoms during outbreaks was roughly 45%²

While these results do not address all potential responses to the pandemic, they illustrate the significant mental and emotional burden that the pandemic will likely place on the workforce.

Moral Injury

Moral injury, a concept that originated in the military, refers to psychological distress that results from violating one's moral or ethical code with actions or the failure to act.^{3,4} Common symptoms of moral in-

jury include intrusive thoughts; intense negative appraisals such as shame, guilt, or disgust; and a reliance on cognitive avoidance^a as a coping strategy.⁶ Moral injury is itself not a mental illness, but the symptoms mentioned can contribute to the development of mental health difficulties, including depression, PTSD, and suicidal ideation.^{3,6} Potentially morally injurious events that may arise among health care providers responding to the COVID-19 pandemic include:

- Following clinical decisions made by others that are believed to be unethical, immoral, or against professional guidance
- Failing to report serious clinical incidents, near misses, or the bullying of an individual, their colleagues, or patients
- Changing belief about the necessity or justification for treatment plans or protocols
- Putting patients or colleagues in danger because of inexperience or indecision such as when individuals are working outside their normal competency
- Hearing of worsening outcomes in the facility where an individual works
- Giving clinical orders or establishing protocols that result in a patient's or colleague's death
- Feeling let down because someone works with insufficient resources or staffing, especially when there is a perception that shortages were avoidable^{3,7}

Williamson et al. systematically reviewed the literature to assess the relationship between moral injury and mental health outcomes, and conducted a meta-analysis based on that literature. The authors estimate that based on the available evidence, exposure to potentially morally injurious experiences (PMIEs) was a significant driver of PTSD, depression, and suicidal ideation across the 6,373 participants included in the meta-analysis. The authors note that while the majority of the literature is specific to the military, the study's results indicate that exposure to PMIEs negatively impact psychological adjustment.⁶ Recent research has begun to examine moral injury in non-military populations. Notably, moral injury has been described in medical students who reported difficulties coping when exposed to trauma for which they felt ill-prepared while working in pre-hospital and emergency care.^{3,8}

Health Risk Behaviors and Distress Responses

Increased rates of addictive behaviors after disasters have been documented in the general population. For example, a study of alcohol and tobacco use among adults before and after Hurricane Katrina found that alcohol consumption increased roughly 185% between the pre- and post-Katrina periods, and there was a significant increase in alcohol consumption after controlling for other factors.⁹ Exposure to trauma may not only increase the frequency of existing behaviors, but also may result in the development of new behaviors. For example, a study of 37,867 non-drinkers in Japan found that 9.6% of the sample began drinking after Japan's "triple disaster" in 2011 (earthquake, tsunami, and nuclear disaster).¹⁰ In a retrospective analysis of survey data, Grieger et al. found that after the Washington, DC, sniper attack,

a Cognitive avoidance includes coping strategies that avoid negative events/outcomes rather than promote positive events/outcomes. Examples include distraction, worry, and thought suppression to avoid or escape thoughts about undesirable situations or problems.⁵

alcohol use, depressive symptoms, PTSD symptoms, and altered safety behaviors, such as driving habits and participation in public events increased.¹¹

Sleep disorders and sleep-related problems also are frequently identified in the post-pandemic period. Zhen et al. examined the relationship between a traumatic event (in this case, a major flood) and sleep problems in a sample of 147 adults, finding a direct, positive, and significant association between traumatic exposure and sleep problems. Furthermore, the authors found evidence that traumatic exposure indirectly affected sleep problems through fear, negative cognition, and depression.¹² Recent evidence suggests that sleep disorders have been frequently identified among health care workers responding to the COVID-19 pandemic.¹³ Several international studies have reported a significant prevalence of sleep disorders among health care workers during the pandemic.^{14–17} Furthermore, exposure to infected individuals appears to be associated with the reporting of such disturbances. A study of 441 health care workers in Poland found that the odds of reporting sleep disorders is roughly three times higher among health care workers exposed to COVID-19-infected patients working in emergency, intensive care, or infectious disease wards compared to health care workers in other wards.¹⁸ This relationship is further supported by a study of 2,346 health care workers in China, which found that frontline medical workers dealing with COVID-19 had roughly twice the odds of reporting a sleep disorder than non-frontline medical workers.¹⁶ Importantly, sleep problems have been found to be associated with PTSD and depression.¹⁹

Cabarkapa et al. note in their review of the literature on the psychological impact of viral epidemics that fear—of the unknown, of becoming infected, of death, or for the vulnerability of those close to them—is frequently reported to be a prominent stressor in the evidence. Furthermore, across much of the published literature on the COVID-19 pandemic, anxiety is a prominent stressor.¹³ At least one study found that the most important factor driving high anxiety was the suspicion of being infected.²⁰

Perceived stress is an important indicator of mental well-being and has been studied in the context of health care workers responding to other infectious disease outbreaks. In their review of the psychological impact of epidemic and pandemic outbreaks, Preti et al. found that, based on the published evidence, between 18% and 80% of health care workers responding to the severe acute respiratory syndrome (SARS) outbreak reported high levels of work-related stress. The review demonstrates, however, that the evidence is mixed on whether health care workers responding to the SARS outbreak experience higher levels of post-pandemic stress.² Interestingly, one prospective study found that while high- and low-risk health care workers did not have significantly different levels of perceived stress initially, over time, low-risk health care workers experienced a decrease in perceived stress while high-risk health care workers perceived an increase.^{2,21}

Exposure to trauma such as a natural disaster has been found to be associated with health risk behaviors in non-health care workers responding to those disasters. After the 2004 Florida hurricanes, a study of 2,249 public health workers found that high hurricane exposure—defined as being in the path of at least one hurricane and experiencing damage or harm—was associated with increased odds of alcohol and tobacco use. In addition, high disaster-related work demand was found to significantly increase the odds

of alcohol and tobacco use.²² There also is evidence that prolonged exposure may be an important determinant of increased health risk behaviors. Rona et al. conducted a cohort study of UK military personnel assessing the relationship of both the duration and the frequency of the deployment on PTSD and alcohol abuse. The authors found that the deployment's duration was significantly associated with alcohol abuse.²³ There also is evidence of a functional relationship between symptoms of post-traumatic stress and alcohol consumption after disaster relief. Simons et al. surveyed 779 disaster relief workers from the American Red Cross that participated in the response to the 9/11 attacks. While the authors generally found low levels of both PTSD and alcohol consumption, they found both hyperarousal and intrusion symptoms^b to be significantly associated with alcohol consumption, hazardous alcohol consumption, and a change in alcohol consumption after controlling for demographic covariates.²⁵

Psychiatric Disorders

Cabarkapa et al. identified post-traumatic stress syndrome, anxiety, and depression as the most commonly diagnosed psychiatric disorders of health care workers responding to severe epidemics.¹³ Early evidence from Wuhan, China, suggests there was a significant burden of mental health disturbances among health care workers during the COVID-19 pandemic, though the magnitude of the burden varies from study to study. One study of 1,257 health care workers from multiple regions of China in late January 2020 found that 70% of those surveyed reported psychological distress, 50% reported depression, 45% reported anxiety, and 34% reported insomnia.²⁶ In a second study of 994 Chinese medical and nursing staff, roughly one-third reported mild mental health disturbances, 22.4% reported moderate disturbances, and 6.2% reported severe disturbances.²⁷ A third study of Chinese health care workers found that roughly 14% of the sample of 1,521 health care workers reported symptoms aligned with psychological abnormality as measured by the Symptom Checklist-90.²⁸ A study of 8,817 Chinese health care workers also indicates that depression, anxiety, somatic symptoms, and suicidal and self-harm ideation were prevalent among the sample roughly three weeks after the onset of the COVID-19 outbreak, with 30%, 21%, 46%, and 7% of the sample reporting each condition, respectively.²⁹ A study of medical workers in Hubei province found that roughly 12% of medical staff had anxiety. Furthermore, anxiety was greater among those with direct contact with COVID-19 patients.²⁰ Importantly, several studies on the impact of the COVID-19 pandemic reported somatization.^{13,29–31} For example, a study of 4,738 frontline nurses in China found that roughly 43% exhibited somatic symptoms, with lethargy, joint pain or pain in the extremities, and shortness of breath most prevalent.³¹

While the prevalence of psychiatric disorders is likely to be high due to the COVID-19 pandemic, there is currently mixed and sparse evidence indicating that the prevalence among health care workers is significantly different than among non-health care workers. A study of 781 Spanish health care workers and other professionals conducted during the peak of the spring COVID-19 outbreak found that health care workers had higher levels of acute stress disorder (ASD) compared to non-health care workers in the study sample. Interestingly, the study did not find different levels of anxiety or depression between

^b Intrusion symptoms refer to symptoms associated with the persistent reexperiencing of a traumatic event. One intrusion symptom is a criterion for PTSD, according to the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition.²⁴

the two groups.³² Research on the SARS outbreak in China comparing health care workers to a healthy control group similarly found that health care workers were not significantly more stressed than controls but did report significantly more psychological effects—both positive and negative—compared to the control group.³³

Evidence from previous outbreaks further supports the notion that infectious disease outbreaks could potentially result in significant psychological and emotional burden. Bai et al. investigated the stress reactions of a sample of 338 staff members at a non-SARS treatment facility in East Taiwan during an outbreak. The authors found that roughly 5% of the sample met criteria for ASD. Furthermore, a significant positive relationship was found between quarantine and ASD, stigmatization, and rejection in the staffer's neighborhood. Lastly, the study found that 9% of those surveyed reported either a reluctance to work or having considered resigning, and the numbers reporting such reluctance were significantly higher in those quarantined (24%) than those who were not (5%).³⁴ In their review of the mental health consequences of disasters on public health and public safety workers, Benedek et al. note that the findings highlight the importance of planning for psychological disorder, distress, and potential workforce absenteeism in epidemics.³⁵ Chan and Huak surveyed 661 doctors and nurses working in a medium-sized general hospital in Singapore during the SARS outbreak, finding that roughly 20% of doctors and nurses had been suffering from PTSD two months after the outbreak.³⁶ Wu et al. examined the psychological impact of the 2003 SARS outbreak in China. Based on a survey of 549 randomly selected employees of a Beijing hospital, the authors found that roughly 10% of individuals met the requirements for a high degree of post-traumatic stress symptoms based on a score of 20 or greater on the Impact of Event Scale-Revised (IES-R). Furthermore, exposure to SARS and quarantine were found to be associated with higher IES-R scores, while an altruistic acceptance of an individual's job-related risk was associated with lower IES-R scores.³⁷ In a qualitative study, Maunder et al. examined the psychological and occupational impact of a SARS outbreak on a teaching hospital treating SARS patients in Canada. The authors found instances of isolation, fear, anxiety, anger, frustration, and fear of stigmatization.³⁸

A minority of studies have examined post-pandemic psychological symptoms. A study of health care workers in Beijing following the 2003 SARS outbreak found that roughly 40% of those who had high post-traumatic stress symptoms during the outbreak continued to exhibit high post-traumatic stress symptoms three years later.³⁷ A slightly larger study after the 2003 SARS outbreak, this time of Taiwanese health care workers, found that roughly 17% of the sample experienced mental health symptoms immediately after the epidemic, while 15% had mental health symptoms at follow-up a year later.³⁹ Predictors of psychiatric disorder episodes among health care workers after the SARS pandemic included a past history of psychiatric illness, less health care experience, and the perception of inadequate training and support.⁴⁰

ASD and acute/post-traumatic disorders have been widely investigated among non-health care workers responding to disasters.³⁵ Among humanitarian relief workers, evidence show that humanitarian relief work is associated with increased occupational exposure to trauma and elevated rates of PTSD.⁴¹ A study measuring the mental health outcomes of police personnel involved in the Hurricane Katrina response found that roughly 30% of the study sample exhibited PTSD symptoms or depressive symptoms. Fur-

thermore, an analysis of work-related exposures on the prevalence of PTSD and depressive symptoms found that after controlling for age, gender, and previous PTSD history, an injury due to assault, injury of a family member, involvement in crowd control, and recovery of bodies were predictors of PTSD symptoms. In addition, rare family contact, injury of a family member, lack of a habitable home, assault, and isolation from regular assignment were found to be associated with increased prevalence of depression.⁴² Measuring the total mental health burden of disaster exposure and work demand among Florida Department of Health workers after the 2004 hurricanes, Fullerton et al. found that the total mental health burden was 11%, with roughly 4% having probable PTSD and 3.8% having probable depression. In addition, greater exposure was found to be associated with greater odds of having probable PTSD or depression, even after adjusting for demographics and work demand.²² While the conditions of work- and disaster-related exposures among relief workers differ from the experience of health care workers responding to the COVID-19 pandemic, many workers likely had contact with the deceased, had a family member suffer from the disease, and/or had been isolated from their standard assignment at work.⁴²

The current body of evidence suggests that health care workers are susceptible to the impacts of trauma in other high-stress environments such as war or non-infectious disease-related disasters.³⁵ Research on the experience of combat medics in military warfare in which their lives are in great jeopardy indicates a significant risk of long-term disability.³⁵ A study of nurses who developed PTSD from their wartime experience found that physiological responses to descriptions of their work with injured soldiers persisted for decades after the war.⁴³ A small study of Turkish health care workers found that those exposed to a natural disaster or terrorist event reported PTSD symptoms at twice the rate of the unexposed. Importantly, this study did not follow established criteria for the diagnosis of PTSD and instead measured distinct symptoms.⁴⁴

The experience of emergency medical technicians, paramedics, and others involved in search and rescue also can inform our understanding of the mental health and well-being implications of the COVID-19 pandemic on the health care workforce. Fullerton et al. conducted a large prospective study of disaster workers, including emergency medical technicians, firefighters, and police officers. The study compared the experiences of workers assigned to an airport disaster response team responding to a plane crash that resulted in significant mortality and serious injury to a similar group of disaster workers who were not exposed to a disaster. The exposed faced significantly higher rates of ASD and PTSD on follow-up after 13 months, and depression on follow up after both seven and 13 months. Furthermore, those with ASD were four times as likely to suffer seven months after exposure. In addition, PTSD was more likely to develop in those with ASD, high exposure, and previous disaster experience. Lastly, the authors found higher usage of health care services for emotional support among the exposed compared to the unexposed.⁴⁵ Evidence from the 9/11 attacks indicates that anger may contribute to the maintenance of PTSD symptoms, and therefore should be included in screenings and used to target individuals for early interventions to avoid the potential development of chronic symptoms.⁴⁶ In a survey of paramedic trainees, Fjeldheim and colleagues found high rates of trauma among the sample. These traumas included witnessing an individual suffering from a life-threatening illness and the sudden, unexpected death of someone close. Increased trauma exposure was found to be associated with a significantly higher prevalence of PTSD.

Furthermore, those displaying PTSD symptoms were found to have significantly higher rates of depression, perceived stress, and physical health symptoms than those without PTSD symptoms.⁴⁷

Evidence from 9/11 suggests that indirect exposure to trauma among mental health relief workers may lead to PTSD even when there is no personal relationship with the victim.⁴⁸ The presence of psychological symptoms that mimic PTSD but were caused by exposure to persons suffering the effects of a trauma is often called secondary traumatic stress (STS).⁴⁹ There is some evidence that STS is prevalent in military mental health workers and nurses of various specialties.^{50,51} Importantly, the research investigating STS among nurses indicates that the research in this field is hindered by small sample sizes and the lack of a standardized measurement instrument.⁵⁰ Among mental health workers treating members of the military, increased negative appraisals of the traumatic event were associated with increased levels of reported STS. The same research found that roughly one in five military behavioral health professionals indirectly exposed to trauma reported all symptoms of PTSD.⁵¹ A study of health care professionals in New Zealand indicates that the prevalence of STS may vary by provider type, with social workers having a higher prevalence of STS than psychologists and MDs.⁵² Importantly, STS's existence is not universally accepted, with some asserting that other factors can explain the PTSD-like symptomology. For example, one study questioned the existence of STS particularly among mental health professionals engaged in trauma therapy, finding instead that work-related stressors were a better predictor of therapists' feelings of distress.⁵³

Phases of Community Psychological Response to Disaster

Importantly, the mental health impact of COVID-19 on the health care workforce likely will vary greatly over the course of the pandemic. The experience of communities that are subject to ecological disasters may be informative in this regard. Communities progress through six phases of psychological recovery leading up to, during, and after an ecological disaster: pre-disaster, impact, heroic, honeymoon, disillusionment, and reconstruction.^{1,54}

Pre-Disaster and Impact: The pre-disaster phase includes fear and uncertainty. The duration of this period varies. Disasters that have a relatively short pre-disaster period may result in feelings of vulnerability, a perceived lack of security, fear of future tragedies, and a perceived loss of control. Conversely, an extended pre-disaster phase may result in guilt for failing to take warnings seriously.^{1,54}

The impact phase generally includes emotional reactions, with the intensity determined by the disaster's severity and rapidity. These reactions can range from shock to panic. Initial confusion and disbelief tend to be followed by a focus on protection and preservation.⁵⁴

Heroic Phase: The heroic phase immediately follows the impact phase and generally includes a high level of activity but a low level of productivity. Community members tend to exhibit rescue behaviors. Risk assessment may be impaired during this period.^{1,54}

Honeymoon Phase: The honeymoon phase is characterized by increased availability of government and volunteer assistance. During this phase, communities bond over the shared catastrophic experience and

both the receipt and provision of assistance to those in need. The burden of certain illnesses may decrease during this phase, after having previously increased, partly due to the increased availability of resources.^{1,54}

Disillusionment Phase: The disillusionment phase includes reduced emotional well-being as emergency response resources are removed from affected communities prior to the restoration of pre-disaster levels of emotional and physical wellness. Sense of community weakens as the focus shifts toward unmet needs. Resentment may develop as resources are potentially targeted to one neighborhood or locality over others. Furthermore, longer-term impacts of stress from disaster exposure may emerge during this period such as health problems and exacerbation of chronic conditions. The disaster’s anniversary is a critical moment for leaders to support the psychological well-being of those affected. Not addressing the disaster’s anniversary can further demoralize, exacerbate distress, and inhibit community recovery.^{1,54}

Reconstruction Phase: The reconstruction phase generally follows the anniversary of the ecological disaster and may last for years. This phase includes the gradual recovery of emotional well-being to pre-disaster levels as individuals attempt to rebuild their lives and social and occupational identities and develop or repair social networks. Some may have accepted the changes and subsequently developed and recognized their own strength and resiliency. Others may experience resentment. Importantly, the recovery timeline in the reconstruction phase will vary between individuals. Furthermore, recovery during this period can include intermittent setbacks.^{1,54}

Risk and Resilience

Predisposing Factors/Risk Factors

Vulnerability to psychological and behavioral effects of a disaster depends on various characteristics, the impact of which may occur either pre-event, during impact, or during recovery. Morganstein et al. provides examples of such characteristics and associated evidence in the general population. Figure 1 displays these characteristics by disaster phase.¹

Figure 1. Factors Increasing Vulnerability to Mental Health Effects of Disasters¹



The type of health care provider and the type of work in which they engage may have a significant impact on the burden of distress reactions and psychological disorders during an outbreak. A recent survey of 2,182 health care workers after the initial surge of the COVID-19 pandemic in China indicates that medical health care workers demonstrate significantly higher levels of insomnia, anxiety, depression, somatization, and obsessive-compulsive symptoms compared to non-medical health care workers. The same research indicates that the most common measured risk factors for insomnia, obsessive-compulsive symptoms, anxiety, and depression were living in rural areas, being female, and being at risk for contact with COVID-19 patients.^{55,56} A study of 781 Spanish health care workers and other professionals conducted during the peak of the spring COVID-19 outbreak found that health care workers had higher levels of ASD compared to the non-health care workers in the study sample. Interestingly, this study did not find different levels of anxiety or depression between the two groups.³² Despite these findings, several other studies have found higher levels of anxiety and insomnia among frontline health care workers during the pandemic compared to non-frontline health care workers.^{16,18,57} One study of 526 Chinese nurses found that frontline nurses experience significantly higher levels of vicarious trauma compared to non-frontline workers. The impact of proximity to exposure is supported by further research indicating that health care workers in close contact with infected patients are roughly 1.4 times more likely to experience fear and twice as likely to suffer from anxiety and depression compared to non-clinical staff.⁵⁸ Similarly, a study comparing health care workers in Wuhan, the epicenter of the initial Chinese outbreak, to health care workers in a different Chinese province found that health care workers in Wuhan had higher rates of both insomnia and stress responses.⁵⁹

Several studies specifically analyzed the varying experiences of different types of health care providers (e.g., doctors and nurses). Cabarkapa et al. identified four studies that examined this relationship after the SARS outbreaks.^{13,60-63} One of the studies found that nurses and health care workers directly treating SARS patients reported higher levels of distress compared to other health care workers. Importantly, this study also found that this relationship was mediated by health fear, social isolation, and job stress, indicating that a substantial proportion of the variance between nurses and other health care workers can be explained by differences in these factors.⁶⁰ The other three studies found similar relationships within the study populations, with nurses experiencing more stress than doctors.⁶¹⁻⁶³ Importantly, at least two studies produced evidence contrary to this relationship. One study of 661 Chinese doctors and nurses found that doctors are more likely to experience psychological symptoms.³⁶ A second study of 2,031 medical workers in China, found that doctors reported higher-than-average scores of perceived stress and perceived depression, and prevalent stress and prevalent anxiety.⁶⁴ Disparities between the experiences of different types of practitioners have been examined in the context of COVID-19. A study of 1,379 health care workers during the pandemic found that general practitioners were more likely to exhibit post-traumatic stress syndrome, while severe insomnia was more likely among nurses and health care assistants.⁶⁵ Women have been found to be at increased risk for adverse psychological outcomes following a disaster compared to their male counterparts.¹ For example, in a study assessing gender-related differences in psychiatric morbidity among 475 patients accessing mental health services after the December 2004 earthquake and tsunami in the Andaman and Nicobar Islands, Viswanath found significantly higher rates of

diagnosed panic disorder, unspecified anxiety disorder, and somatic complaints among females compared to males.⁶⁶ This relationship also has been demonstrated in response to the COVID-19 pandemic. A survey of 441 nurses at a hospital in Iran found that the odds of female nurses reporting were roughly 3.3 and 4.6 times that of male nurses for anxiety and depression, respectively.⁶⁷ Xiaoming et al. conducted a large survey of 8,817 hospital workers in Chongqing, China, and estimated that the odds of high-level somatic symptoms were roughly double among female respondents compared to male respondents.²⁹ This relationship is echoed by other research.⁶⁸⁻⁷¹

Research indicates that health care workers may experience stigma when responding to outbreaks of infectious disease, which may lead to psychological or emotional symptoms.¹³ Juan et al. found that the perception of stigmatization and rejection in one's neighborhood was associated with depressive symptoms among 456 hospital workers in Chongqing, China, during the COVID-19 pandemic.³⁰ A large study of health care workers during the SARS epidemic found that roughly half of respondents experienced stigmatization, and roughly 30% experienced ostracism from family members. Interestingly, roughly 75% of respondents reported feeling appreciated by society, indicating that perceived stigma can occur regardless of perceived appreciation.⁷² A smaller study of Korean nurses during a Middle East Respiratory Syndrome (MERS) outbreak indicates that stigma may impact mental health both directly and indirectly through stress.⁷³ Stigmatization and other stressors may have important workforce implications. In a study of health care workers responding to a SARS outbreak in Taiwan, 20% felt stigmatized or rejected in their neighborhood, and 10% of respondents either considered resignation or were reluctant to work.³⁴

Socioeconomic status also is a risk factor for adverse psychiatric outcomes such as PTSD after a disaster. This relationship has been demonstrated in the general population by DeSalvo et al. The authors surveyed a cohort of 1,542 workers in New Orleans post-Hurricane Katrina and found significant associations between PTSD symptoms and both education level and annual household income. Those with the lowest educational attainment and lowest annual household income showed higher percentages of PTSD symptoms. The study's analyses also revealed significant associations of PTSD symptoms for those who live alone and did not have proper insurance. Unexpectedly, 24.1% of surveyed participants who continued to have PTSD symptoms six months after the disaster were living in a friend's house during the evacuation. This, the authors posit, suggests that social support protections against adverse psychological outcomes may be time-dependent when the disaster has an extended impact phase.⁷⁴

Military experience, including of combat medics, indicates that the duration of exposure is an important risk factor for negative psychological outcomes. Rona et al. examined the impact of deployment duration on psychological symptoms and domestic behavior. Deployment for 13 months or more in a three-year period was associated with both psychological symptoms and troubles at home. An association was found between the expectation that the most recent deployment's duration would be shorter than it actually was and PTSD. Surprisingly, no association was found between psychological symptoms and the number of deployments during the three-year period.²³

Resilience and Moderating Factors

The above literature focuses on the burden or risk of adverse mental health effects after a disaster. This aligns with the historical perspective through which the implications of a disaster have generally been examined. In a review of the literature on psychological resilience and post-traumatic growth in disaster-exposed organizations, Brooks et al. highlights a paradigm shift underway in trauma research resulting from a shift in focus from risk to resilience. While a sizable minority of those exposed to trauma will inevitably develop mental health problems following a disaster, many will continue to function well and may even have positive emotional experiences. The authors provide evidence associated with three broad groups of factors associated with psychological resilience among the workforce of disaster-exposed organizations: Training (experience and perceived competence), social support, and effective coping strategies.⁷⁵

Training, Experience, and Perceived Competence

According to Brooks and colleagues, research indicates that resilience is associated with an employee's sense of competence or preparedness. The authors specifically highlight that workforce members who perceive themselves to be adequately trained for crisis work may be more resilient (i.e., less at risk of suffering mental health symptoms) than those who do not feel adequately trained.⁷⁵ The impact of perceived competence on resilience has been studied among social workers after the 9/11 terrorist attack in New York City. Those with a higher measured sense of mastery using the Pearlin Mastery Scale were found to be generally less distressed 20 months after the attack and suffered less secondary trauma and less burn-out.⁷⁶ In a study of police officers who responded to the 2004 Madrid terrorist attacks, Gabriel et al. found very low prevalence of psychopathologies, with only two officers reporting depression symptoms. The authors attributed the low prevalence to either the officers' high level of experience in responding to terrorist incidents or underreporting but note that a validated scale was used and reporting was anonymous.⁷⁷ A study of 581 Norwegian personnel mobilized for the 2004 tsunami found that preparation specific to the mission was associated with lower levels of stress reactions.⁷⁸ Evidence from the British Armed Forces further supports perceived competence as a moderator. Iversen et al. found that performing above an individual's training and experience was strongly associated with post-traumatic stress symptoms.⁷⁹ Research supporting the protective effect of training, experience, and perceived competence aligns with numerous post-disaster studies that indicate fewer adverse mental health effects among professional rescue workers compared to volunteers.^{80–82}

Some evidence exists to support the importance of training in mitigating adverse mental health impacts on the health care workforce during disease outbreaks. In a survey of Canadian health care workers in Toronto and Hamilton after the 2003 SARS outbreak, the authors found lower levels of burnout, psychological distress, and post-traumatic stress among Hamilton health care workers. Favorable outcomes at the Hamilton site were partially explained by a protective effect stemming from the perception of having adequate training and support.⁸³ A study of family medicine doctors in both Hong Kong and Toronto during the 2003 SARS outbreak produced similar results, indicating previous training in infectious disease protocols protected against poor mental health.⁸⁴ Lastly, a third study on the SARS outbreak limited to Hong Kong found that those confident in their knowledge of infection control and related skills reported lower stress levels and fewer adverse psychological effects.³³

Peer/Social Support

Several studies, including some on the COVID-19 pandemic, show that social support can protect against certain adverse mental health effects. In a study of Chinese health care workers in Wuhan, Xiao et al., found that reported anxiety, stress, and self-efficacy were dependent on social support and quality of sleep.⁸⁵ A study of nurses at a SARS treatment hospital in Taiwan found that family support was negatively associated with reported anxiety and reported sleep problems. Importantly, these results were not generated through multivariate analysis and therefore do not control for confounding factors.⁸⁶ A study of doctors and nurses responding to SARS in Singapore found that providers that did not perceive support from their supervisor or department head were more likely to experience psychological symptoms. Furthermore, providers that perceived support from colleagues were less likely to report psychological symptoms.³⁶ This is particularly important as research on the SARS outbreak indicates that health care workers may experience some discrimination from their community and distancing from family members due to proximity to the disease.⁸⁷ Health professionals have indicated that social support such as supervision, peer support, and support from friends and family could be a vital and frequently used coping strategy to deal with STS. Research indicates that such approaches can normalize and reduce the impact of STS, correct distorted perceptions, and offer objective viewpoints on clinical issues while offering a place to communicate sensitive reactions, provide resources, and maintain a therapeutic connection with clients.⁵² This relationship also is supported by research on firefighters working during hurricane response, which found that those living with family members were less likely to report depressive symptoms.⁸⁸

Evidence from United Nations (UN) soldiers and humanitarian relief workers indicates that social network support (including from family, friends, neighbors, and colleagues) moderates the relationship between trauma exposure and trauma reactions, particularly among relief workers. Notably, the responses of UN soldiers and relief workers were markedly different, which may indicate that to the extent that the COVID-19 response workforce is more akin to relief workers than soldiers, careful attention may need to be paid to modifying interventions that are developed based on military strategies.⁸⁹ Social support from colleagues and managers also may protect against adverse mental health effects.⁷⁵ In an analysis of 333 Canadian nurses working during the 2003 SARS crisis, organizational support was found to be associated with less avoidance behavior and a lower state of anger.⁹⁰ Furthermore, an analysis of exposure to extra-organizational stressors among Australian police officers found that both work culture support and supervisor support were negatively associated with psychological strain.⁹¹ Further support for this relationship among police officers can be found in the aforementioned study by Gabriel et al.⁷⁷ Further research found a significant relationship between increased support and lower levels of distress among social workers following the 9/11 attacks.⁷⁶ Additional research following the 9/11 attacks further supports this relationship, finding that social support is negatively associated with both post-traumatic stress symptoms and depression.^{92,93} Importantly, one of the two studies that presented these findings found that the protective effect was strongest among rescue and recovery workers.⁹²

Coping

The encouragement of healthy coping is emphasized across the literature. Clinicians use various coping strategies, whether intentionally or not. A study of 657 US health care workers responding to the

COVID-19 pandemic found that nearly 60% of respondents used exercise as a coping strategy, making it the most popular coping strategy across the sample. Respondents also showed significant interest (33%) in obtaining a means of self-guided counseling with access to a therapist.⁹⁴ A study of 661 health care providers in Singapore responding to a SARS outbreak identified both support from supervisors/colleagues and clear communication of directives and precautionary measures as factors significantly associated with the increased ability to cope.³⁶

Among disaster relief workers, self-care strategies reportedly protect against STS, burnout, and mental illness and promote vicarious post-traumatic growth.^{95,96} A disaster relief worker study found that an “approach acceptance” attitude toward death rather than fear or avoidance was associated with increased post-traumatic growth at the six-month follow-up.⁹⁷ These findings align with prior research indicating that avoidance of traumatic thoughts is associated with increased psychopathology.^{75,98,99}

Hardiness—a coping style focused on a sense of meaning and purpose and the belief that one can control their own destiny and that change is a normal life state—also was found to be associated with resilience.⁷⁵ In an analysis of survey data from 67 social workers providing services to disaster-exposed individuals, Hodgkinson et al. found that hardiness was associated with less psychological symptoms.^{75,100} The authors estimated that one-third of the variation in social worker response, which included measures of psychological symptomology and well-being, were explained by differences in coping style.¹⁰⁰

Post-Traumatic Growth

While the literature often focuses on the negative psychological and behavioral impact of disaster response, there is evidence that experiencing a disaster and engaging in relief efforts can result in a positive impact on both personal and professional levels.^{75,78} Disaster response can be seen as rewarding and leading to a sense of achievement, improved confidence, self-esteem, and compassion.^{101–104} Disaster relief work also has been linked to an increased commitment to living a full life, placing increased value on one’s own life, a stronger sense of purpose, and an increased perceived connection to the community.^{102,105–108}

Research also has explored the positive professional impact of disaster relief work. Soliman et al. surveyed disaster relief workers responding to a local tragedy, specifically the Great Flood of 1993 in the Mississippi River Valley, and found that 80% of survey respondents felt that the relief work had a positive effect on their professional growth.¹⁰³ A small survey of 36 embassy workers based in Japan after the 2011 earthquake, tsunami, and nuclear meltdown reported that their disaster relief efforts had a positive impact on their career.¹⁰¹ In a small (n=26 for focus groups, n=136 for survey) mixed methods analysis of Guatemalan humanitarian aid workers, Putman et al. found that the level of perceived personal accomplishment felt during relief work was inversely associated with PTSD.¹⁰⁹ In the aftermath of the 9/11 terrorist attacks in New York City, Eidelson et al. randomly surveyed half of the psychologists that were members of the New York, New Jersey, and Pennsylvania state psychological associations. Seven hundred twelve psychologists completed and submitted surveys, a return rate of roughly 15%. The results of the surveys indicated that roughly 54% of respondents reported some increase in positive feelings about

work compared to an 11% increase in negative feelings. The authors also found that positive feelings were associated with psychologists who reported engaging in volunteer work.¹¹⁰

POTENTIAL SHORT- TO INTERMEDIATE-TERM INTERVENTIONS

While the adverse psychological and emotional consequences of disasters are generally recognized, the question of what if anything should be done to address these consequences remains unknown. To answer this question, the National Volunteer Organizations Active in Disaster formed the Early Psychological Intervention (EPI) Subcommittee in 2004 and engaged in an 18-month consensus building process to answer the following questions:

1. Is there any value in EPI in the wake of disasters?
2. How if at all should EPI be configured?
3. What if any specialized training should individuals receive in preparation to perform EPI in the wake of disasters?

The group arrived at five points of consensus: EPI is valued; is a multicomponent system dependent on the needs of those impacted; specialized training in EPI is necessary; EPI is on a continuum of psychological care that ranges from pre-incident preparedness to post-incident psychotherapy, depending on need; and cooperation, communication, coordination, and collaboration are essential to delivering EPI.¹¹¹

Evidence-Informed Elements of Potential Interventions

Psychological First Aid (PFA)

Recognizing the need for evidence-informed interventions after mass trauma, the Substance Abuse and Mental Health Services Administration and Department of Health and Human Services held a meeting of international experts to discuss treating those exposed to mass trauma and reached consensus on five essential elements of immediate- and mid-term interventions after exposure to mass trauma. The five essential elements identified are promotion of a sense of safety, promotion of calming, promotion of a sense of self- and community-efficacy, promotion of connectedness, and instillation of hope.¹¹² The elements were subsequently published in a paper by Hobfoll et al. that detailed the application to interventions and guided development of many contemporary frameworks for interventions in this area. Importantly, Hobfoll and colleagues caution against recommending specific intervention models for various reasons. Traumatic events are heterogenous, and therefore flexibility in designing the intervention, providing the ability to adapt to needs that arise in specific situations, is ideal.¹¹²

The PFA framework is designed to promote the well-being of both individuals and communities after the traumatic event. It is grounded in the essential elements developed by Hobfoll et al.¹ Importantly, an essential characteristic of PFA is its simplicity and accessibility, which allows non-clinicians to deliver it.^{1,113} PFA is widely taught and guidelines have been published around the world to guide the development of

PFA-based interventions. To ensure that PFA guidelines were informed by evidence, Dieltjens and colleagues, on behalf of the Belgian Red Cross-Flanders, reviewed the existing PFA guidelines and the evidence for their effectiveness. The study, which was conducted in 2014, identified five PFA guidelines. The guidelines varied based on the rigor of the process by which they were developed and the base of evidence that informed their development. Furthermore, the authors also note, in agreement with previous reviews on the effectiveness of PFA, there is very little empirical evidence about the effectiveness of PFA interventions.^{113–115} The assertion that PFA lacks a base of evidence has been echoed in more recent commentary.¹¹⁶

Behavioral Techniques

Several well-established behavioral health techniques—including diaphragmatic breathing, progressive muscle relaxation, and guided visual imagery—reduce physiological arousal.¹ In a study of 40 randomized healthy Chinese adults, adults trained in diaphragmatic breathing had significantly lower negative affect scores compared to a control group.¹¹⁷ Relaxation training also has been examined as an intervention for mitigating the negative impacts of trauma-related adverse mental health impacts. Manzoni et al. conducted a systematic review and meta-analysis of the research on the effectiveness of relaxation training programs on anxiety, finding that such training had a medium-large effect on anxiety. Importantly, the authors found significant heterogeneity between the studies, some of which was explained by differences in the relaxation technique implemented. Progressive relaxation, meditation, and applied relaxation demonstrated the most promising results.¹¹⁸ Behavioral techniques offer victims of trauma important benefits. Namely, the techniques are easy to learn, simple to teach, and can be shared by laypeople (i.e., non-clinicians with limited training). Furthermore, the techniques are easily accessible, have limited side effects, increase self-efficacy, and do not carry the potential stigma associated with seeking formal care.¹

Psychosocial Interventions

Psychosocial interventions also can effectively mitigate development of ASD, PTSD, and depression post-trauma. Substantial evidence supports the effectiveness of post-trauma psychotherapy and cognitive behavioral therapy on the general population.^{1,35} There also is research recommending using psychosocial interventions for health care workers post-infectious disease outbreak. In their review of the literature on the psychological impact of viral epidemics and ways to address that impact, Cabarkapa found 44 studies that recommend psychosocial interventions, noting the need for additional psychosocial support that employs precise care and effective strategies.¹³ Importantly, while the studies recommend psychosocial interventions, they do not evaluate or discuss the effectiveness of such interventions. All are descriptive studies meant to assess the emotional or psychological burden on health care workers and recommend the implementation of psychosocial support.

Benedek and colleagues emphasize that the theory of mass traumatic exposure as a contributing factor in developing ASD and PTSD in large groups has been recognized and accepted long before the relationship was empirically demonstrated. This led to the development of strategies such as after-action reviews and subsequently psychological debriefings, which are often applied to first responders.³⁵ Richins et al. reviewed the literature evaluating the use of early interventions in emergency and other high-risk

organizations and posited that the three most commonly implemented post-trauma interventions are psychological debriefing, CISD, and trauma risk management. Each is detailed below. The authors identified 50 articles for inclusion in their review, finding that early interventions can effectively help emergency responders manage post-incident trauma when the interventions respect organizational culture, are supported by the organization and its senior management, and account for and use existing social cohesion and peer-support systems within organizational teams.¹¹⁹

Psychological Debriefing and Critical Incident Stress Debriefing (CISD)

Importantly, the single session one-on-one psychological debriefing has not been found to be effective at mitigating the effects of trauma,^{41,120,121} namely, development of ASD and PTSD, and in some cases, can cause additional harm.¹²² Importantly, in reviewing the literature on psychological debriefings, which evaluated 11 randomized control trials, Bisson et al. found that studies that identified negative impacts from debriefings had longer follow-up periods.¹²² More recently, a critical body of evidence has developed evaluating group CISDs.¹²³ Adler et al. analyzed the effectiveness of battlemind debriefings, the military's adaptation of psychological stress debriefings, on 2,297 US soldiers returning from a peace-keeping mission in Iraq. The participants were randomized by platoon, and the effectiveness of the debriefing was assessed both in general and when compared to stress education and a battlemind-specific post-deployment training program. The study did not find a significant difference in reported PTSD symptoms, depressive symptoms, or sleep problems associated with small group debriefings across the study population. The study found a significantly lower rate of reported depression symptoms at follow-up among participants who received large group debriefings, but no significant effect on other outcomes measured.¹²⁴ Furthermore, the study found a significant impact from the debriefing on the most highly exposed to battle, but Tuckey et al. notes that these effects tend to be small in size with very few participants highly exposed.^{123,124}

Tuckey et al. conducted a randomized control trial to investigate the effectiveness of CISD as an intervention for post-traumatic stress, psychological distress, and alcohol consumption after volunteer firefighters were exposed to a traumatic event. The authors found that CISD was associated with moderate reductions in alcohol consumption and increases in quality of life compared to no intervention and education alone, respectively, after controlling for pre-intervention scores on those outcomes. Importantly, CISD was not found to be more effective than either no intervention or an educational-only intervention at reducing post-traumatic stress or general psychological distress.¹²³

Schwartz Center Rounds®

Taylor et al. systematically reviewed the literature to determine the impact of Schwartz Center Rounds® (Rounds) on health care staff, identify key features of the Rounds, scope evidence for similar interventions, and compare the effectiveness of Rounds to these alternative interventions. The authors found that the evidence base for Rounds was generally limited and overall of low to moderate quality due to weak study designs, including no control group. Based on the limited available evidence, the authors provide several overall results. First, Rounds were generally highly valued by attendees, but attendance tended to

represent a small proportion of the total staff. Next, most of the reviewed studies indicated that attendees reported a positive impact of Rounds on the self. These responses included impacts such as improved well-being and coping. Second, the authors found that most studies indicated that respondents reported a positive impact on the patients that they serve such as through increased compassion or empathy. Next, most studies reported a positive impact on colleagues through reported improved teamwork, compassion, or empathy toward colleagues. Several studies also presented evidence of organizational benefits from Rounds. Examples include culture change, practice change, a reduced hierarchy, and a shared system of values or vision.¹²⁵

Interventions for Moral Injury

Griffin et al. also reviewed the evidence of potential interventions and treatments for moral injury, noting that as of 2019, such evidence is sparse, but that most, if not all, PTSD evidence-based psychotherapies have been found to statistically significantly reduce guilt and shame, which justifies using those methods to treat moral injury. Conversely, in commenting on moral injury, Williamson et al. cautioned that some standardized PTSD treatments such as prolonged exposure may potentially worsen the patient's feelings of guilt and shame.¹²⁶ Importantly, Griffin et al. noted that evidence from randomized controlled trials of sufficient power is not currently available to establish clinical significance. The authors further assert in their findings that psychological treatment is not a suitable substitute for social mobilization to address the conflicting values that cause moral injury to arise, as communal bonds and social relationships are significant to both the occurrence of morally injurious events and the mitigation of their consequences.¹²⁷

Evaluations of Interventions Post-Infectious Disease Outbreak

Two reviews have considered the evidence for responding to the mental health impact of pandemics. Yue et al. reviewed the literature on mental health services after infectious disease outbreaks, devoting a section to services targeting health care providers. The authors present evidence of the effectiveness of various psychosocial interventions to mitigate the psychological and emotional burden on health care providers.¹²⁸ Table 1 presents the interventions included in Yue et al. that specifically target health care workers and for which some evaluation was provided. For a complete presentation of the interventions reviewed, please see the original article (the executive summary includes a link).

Table 1. Characteristics and Main Results of Evaluations of Interventions Targeting Health Care Workers¹²⁸

Author (Year)	Country	Infectious Disease	Study Design/ Publication Type	Sample Size	Description	Outcome
Blake et al. (2020) ¹²⁹	United Kingdom	COVID-19	Intervention Development	Health Care Students, RNs, Allied Health Professionals	Delivery of an e-package containing evidence-based guidance, support, and signposting related to psychological well-being for hospital employees. Development process included public involvement and content development with iterative peer review. Followed by delivery and evaluation.	Within seven days of release, the package was accessed nearly 18,000 times and got more than 50,000 exposures via social media. Eighty-two percent of participants reported using the provided information, and all respondents reported plans to use the information in the future.
Cole et al. (2020) ¹³⁰	Sierra Leone	Ebola Virus Disease	Pre-Post Intervention	Ebola Treatment Center Staff (253)	Small group cognitive behavioral therapy focused on treating depression and functional impairment over six weeks.	Post intervention anxiety, depression, and functional impairment were significantly reduced. Sixty-one percent of participants met their recovery goals and were highly satisfied with the intervention (four out of five rating).
Ping et al. (2020) ¹³¹	Malaysia	COVID-19	Report/ Informal Qualitative Evidence	Frontline Nurses	Ultra-brief psychological interventions for one month, including training on group problem-solving techniques and mindfulness skills.	Qualitative responses indicate that participants were helped to respond effectively to anger, frustration, anxiety, and general psychological wellness.
Rastegar Kazerooni et al. (2020) ¹³²	Iran	COVID-19	Report	Junior Medical Students	Near peer mentoring on support services such as relaxation techniques and time management via a social media platform by senior students under the supervision of expert faculty.	Seventy-one percent of participants believed the platform had a significant impact on their adjustment to emergency conditions.

From Schwartz et al.'s narrative review of the literature on addressing post-pandemic clinician mental health, the authors identified seven narrative themes and associated implications for practice.¹³³ Table 2 displays the themes with the associated implications for practice.

Table 2. Narrative Themes and Associated Practice Implications to Address Post-Pandemic Clinician Mental Health¹³³

Theme	Practice Implication
Theme 1: The Need for Resilience and Stress Reduction Training	Integration of stress reduction and resiliency training into clinician training
Theme 2: Providing for Clinicians' Basic Needs	Ensure that clinicians' basic needs such as personal protective equipment, food, rest, shelter, transportation, and childcare are provided for
Theme 3: The Importance of Specialized Training for New Job Roles	Adoption of specialized skill assessment and training programs and use of clear communication for redeployment
Theme 4: Recognition and Clear Communication from Leadership	Leveraging clear communication strategies to reassure clinicians and provide up-to-date information
Theme 5: Acknowledgement of and Strategies for Addressing Moral Injury	Proactive assessment of psychological well-being and availability of both informal and professional support for clinicians
Theme 6: The Need for Peer and Social Support Interventions	Provision of routine opportunities for social connection
Theme 7: Normalization and Provision of Mental Health Support Programs	Routine provision of mental health education and support to be delivered proactively to protect long-term clinician well-being.

In addition to the evidence synthesized in the reviews, below are three models for interventions specifically designed for those responding to disasters. Two of the models, Trauma Risk Management and the 512 Psychological Intervention Model (PIM), have been evaluated using randomized designs.

Anticipate, Plan, and Deter (APD) Responder Risk and Resilience Model

Schreiber et al. developed the APD model as an alternative to one-size-fits-all singular encounter interventions, such as CISD. The model provides an evidence-informed method for understanding and managing psychological impacts on providers, accounting for both risk and resilience in both health care workers and their families. The APD model does this through operational actions that enhance resilience, which the authors refer to as hazard-specific stress inoculation. During the anticipate phase, participants receive pre-event stress inoculation training on the psychosocial implications of responding to mass casualty events. During this training, participants develop a personal resilience plan to anticipate challenges, identify coping resources and strategies, and identify resiliency factors such as a sense of purpose for their work. Finally, participants are trained to employ their plan and monitor their stress exposure.¹³⁴ This model has been employed in numerous settings, including in response to the Ebola and COVID-19 pandemics.^{134,135} Qualitative results based on experiences from the Ebola response indicate that the model was a successful means to proactively monitor stress and promote each individual's resilience plan as necessary.¹³⁴ During the COVID-19 pandemic, the University of Minnesota Medical Center employed the APD model combined with the US Army "battle buddy" system, which involves assigning peers to monitor, validate, and address each other's stressors.¹³⁵ To date, there are no quantitative evaluations of the APD model's effectiveness.

Trauma Risk Management (TRiM)

Traumatic events often lead to organizational difficulties and low morale. TRiM is a proactive, peer-led, group-delivered trauma management strategy to keep organizations and individuals within the organizations functioning following traumatic events.¹³⁶ TRiM originated from within the UK's Corps of Royal Marines. The program allows commanders to give their subordinates the appropriate support post-traumatic event. The UK's Corps of Royal Marines and police departments highly regard the program as an early intervention for these specific populations, which have high-trauma exposure.¹³⁷ TRiM has become a widely acceptable practice in the UK.¹³⁶ As noted above, the TRiM program involves training non-medical personnel within an organization. Once training is complete, these individuals are appointed as specialists who are equipped with the tools and knowledge to successfully manage the psychological aftermath of traumatic events within their organization. Specialists have various post-trauma duties such as conducting structured risk assessment interviews for distress, identifying individuals who require a specialist's input based on the interview, and offering those individuals support and education.¹³⁶

The above Richins et al. review found mixed empirical evidence of the effectiveness of the TRiM model.¹¹⁹ Frappel-Cooke conducted a non-randomized parallel-group comparison trial to evaluate the effect of TRiM on post-trauma reaction levels. The authors surveyed a sample of 180 military personnel pre-deployment to operational deployment. The analysis indicates that those with TRiM experience reported lower psychological distress than those exposed to TRiM for the first time.¹³⁸ Importantly, the study did not provide evidence of differential reductions in general distress before and after deployment in the treatment group compared to the control group. This study also does not provide complete results of regression output, including all covariates, and therefore confounding factors cannot be assessed. Lastly, there are concerns about systematic differences between the two groups studied, including standards for entry, group ethos, and response rate.¹³⁹

Two further evaluations of TRiM, including one cluster randomized trial, found no significant difference between pre- and post-intervention trauma and anxiety.^{140,141} The trial randomized the UK's Corps of Royal Marines by battleship and found that the treatment group had less reported disciplinary offenses during its deployment. Importantly, the trial participants had minimal exposure to potentially traumatic events, which may indicate that the results are not generalizable to other populations.^{139,141}

TRiM also has been studied outside of the military context, specifically in the law enforcement population. Hunt et al. examined the use of TRiM among the Cumbria Constabulary after a mass casualty incident. The study examined 640 police officers, roughly 40 of whom received some combination of TRiM briefings and TRiM risk assessments. The more psychologically distressed participants also were provided with a therapy intervention. The authors found that, on average, the reductions in psychological risk among the non-treatment group and those that received both the treatment and clinical intervention were similar, while psychological risk in the treatment group remained stable. The authors found the intervention helped reduce sickness absences and psychological risk in newer employees.¹⁴²

512 Psychological Intervention Model

Following the 2008 Wenchuan, China, earthquake, which killed nearly 70,000 people, the Chinese military developed a PIM for military rescuers responding to disasters. Known as 512 PIM, it was based on CISM principles and included five stages:

1. Introduction (explaining the session's goals and developing a friendly and trustful atmosphere)
2. Facts and thoughts (participants describe the facts of the trauma as they see them, and then recall their first thoughts during the trauma)
3. Reaction and symptoms (participants reconstruct the trauma and accompanying emotions in detail, and then describe the stress symptoms they experience during and immediately after the event, and currently)
4. Stress management (tips and advice on coping with the trauma or stress symptoms)
5. Training of cohesion (e.g., participants were instructed to play games that needed team cooperation, and participants were asked to say in private or public what they most wanted to say)

Wu et al. conducted a randomized control trial and compared the impact of 512 PIM to both a psychological debriefing and a control group receiving no intervention. The authors found that, at both the two- and four-month follow-up, those receiving 512 PIM sessions reported significantly lower scores of PTSD. Differences in PTSD score were not significant at the one-month follow-up or the baseline. The authors also found that 512 PIM participants had lower scores for reexperiencing, avoidance, and hyperarousal compared to the debriefing or control group at both the two- and four-month follow-up. The authors posit that the effective reduction in symptoms may be due to including both CISM and cohesion training in 512 PIM.¹⁴³

CONCLUSION

COVID-19's potential behavioral and psychological impact on the health care workforce is significant. While the experiences of the general population, the military, and to a lesser extent, those involved in disaster relief work have been studied post-disaster, the body of evidence directly studying the impact on the health care workforce is sparse but developing quickly in the wake of the COVID-19 pandemic. The small body of evidence directly related to health care workers and pandemics combined with the experience of similar populations can provide some insight into the potential increases in health risk behaviors, distress responses, psychological disorders, and factors potentially associated with resilience. Robust evaluations of interventions are hard to come by, both on an individual and organizational level. Therefore, the body of evidence about the impact and factors associated with resilience should be used to design interventions that promote resilience and mitigate adverse effects.

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