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# MENTAL HEALTH IMPACTS OF CLIMATE CHANGE: PERSPECTIVES FOR THE ED CLINICIAN



**Authors:** Patrice K. Nicholas, DNSc, DHL (Hon), MPH, MS, RN, NP-C, FAAN, Suellen Breakey, PhD, RN, Bradley P. White, MSN, RN, Margaret J. Brown, DNP, RN, PMHNP-BC, Jenny Fanuele, MMSc, PA-C, Roksolana Starodub, PhD, ACNP-BC, and Ana Viamonte Ros, MD, MPH, Boston, MA, and Miami, FL

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## Contribution to Emergency Nursing Practice

- The current literature on climate change and mental health impact indicates a significant need for education of health professionals in emergency departments and other health settings.
- This article contributes strategies to provide an overview of the health consequences of climate change with a focus on mental health impact to increase the awareness of ED providers.
- Key implications for emergency nursing practice found in this article are that nurses and advanced practice providers play a key role in ensuring timely screening for climate-related mental health impact in vulnerable populations and implement effective interventions to limit the long-term effects caused by the acute psychological trauma as well as chronic psychological trauma associated with the impact of climate change.

## Introduction

It is well established that climate change adversely affects health outcomes.<sup>1,2</sup> The 2019 report of The Lancet Countdown on Health and Climate Change: Ensuring that the

Health of a Child Born Today Is not Defined by a Changing Climate suggests that a child born today will experience a world that is more than 4°C (7.2°F) warmer than the preindustrial average.<sup>3</sup> This impact on our climate has significant deleterious health consequences for individuals, communities, populations, and our world. Rising temperatures, precipitation extremes, extreme weather events, and sea-level rise have led to increases in exposures to extreme heat events, poor air quality, reduced food and water quality, changes in infectious agents, and population displacement.<sup>2,4,5</sup> These effects have also led to an increase in heat-related and cardiopulmonary illnesses, food-, water-, and vector-borne diseases, and mental health impacts.<sup>6</sup>

The deleterious health effects of climate change are not distributed evenly; in fact, those who contribute the least to greenhouse gas emissions are disproportionately affected—a concept known as climate (in)justice.<sup>7,8</sup> The vulnerable groups include those living in low- or middle-income countries, as well as communities of certain colors, immigrant groups, indigenous peoples, children and pregnant women, older adults, people with pre-existing medical or psychiatric illness, certain occupational groups, people with disability, and those with low socioeconomic status.<sup>9</sup> These vulnerable groups are at significant risk of health consequences in our world with a changing climate. Notably, the physical health consequences of climate change have received greater attention in the literature, whereas the mental health impacts of

Patrice K. Nicholas is a Distinguished Teaching Professor and Director, Center for Climate Change, Climate Justice, and Health, MGH Institute of Health Professions School of Nursing, Boston, MA.

Suellen Breakey is an Associate Professor, MGH Institute of Health Professions School of Nursing, Boston, MA.

Bradley P. White is an Instructor, MGH Institute of Health Professions School of Nursing, Boston, MA.

Margaret J. Brown is an Assistant Professor, MGH Institute of Health Professions School of Nursing, Boston, MA.

Jenny Fanuele is an Instructor, Physician Assistant Studies Program, MGH Institute of Health Professions School of Health and Rehabilitation Sciences, Boston, MA.

Roksolana Starodub is an Assistant Professor, MGH Institute of Health Professions School of Nursing, Boston, MA.

Ana Viamonte Ros is Associate Dean for Women in Medicine and Science and an Associate Professor, Herbert Wertheim School of Medicine, Florida International University, Medical Director, Palliative Care Services and Bioethics, Baptist Health South Florida, and Director, American Medical Women's Association, Miami, FL.

For correspondence, write: Patrice K. Nicholas, DNSc, DHL (Hon), MPH, MS, RN, NP-C, FAAN, MGH Institute of Health Professions School of Nursing, 36 1st Avenue, Boston, MA 02129; E-mail: [nicholas.patrice@mgh.harvard.edu](mailto:nicholas.patrice@mgh.harvard.edu).

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climate change are often overlooked.<sup>10,11</sup> The purpose of this paper is to provide an overview of the health impacts of climate change with an emphasis on mental health impacts, examine the roles of ED clinicians, and describe a model of care based on developing a climate-change health history, physical examination, differential diagnoses, and management plan that incorporates patient education and follow-up evaluation. Key to this overview is the emergence of new terminology related to climate change and health, including solastalgia—mental distress caused by environmental change, particularly global climate change—and ecoanxiety—climate anxiety or grief related to environmental degradation or change. Last, an overview of the mental health impacts related to the coronavirus disease (COVID-19) pandemic are also provided. Although there is no established causal relationship between COVID-19 and climate change, there are notable similarities in their impact on human health and well-being.

Recent reports in the medical and interprofessional literature regarding the association between physical health and climate change urge that clinicians become educated about the impact of greenhouse gas emissions on climate and health.<sup>2,3</sup> Important advances in the scientific underpinnings of the impact of climate on health have emerged in recent literature with urgent warnings about current and emerging health impacts.<sup>1,12,13</sup> The most recent Intergovernmental Panel on Climate Change Special Report: Global Warming of 1.5°C [2.7°F]: Summary for Policymakers<sup>14</sup> and previous Intergovernmental Panel on Climate Change reports<sup>2,4,5,15</sup> strongly suggest that major pathways exist by which climate harms health through direct effects (eg, increased exposure to high ambient temperatures); respiratory air pollutants; infectious diseases (vector- and water-borne); respiratory disorders, including allergies such as pollen allergy; and food and water insecurity. The effect of climate change on mental health constitutes a critical area for clinicians, particularly emergency nurses and advanced practice providers—nurse practitioners, physician assistants, and physicians—to address. Haines and Ebi<sup>1</sup> note that exposure to extreme events increases the risk of mental health sequelae, particularly depression and anxiety, which may disproportionately affect those with pre-existing mental health problems.

Mental health issues related to climate change include acute stress disorder, post-traumatic stress disorder, depression, and anxiety. Several authors have discussed the significant mental health vulnerabilities—both acute and chronic—related to adverse effects that occur after climate-related disasters.<sup>16–19</sup> Galea et al<sup>20</sup> found that after Hurricane Katrina, 49.1% of those who remained in New Orleans had developed an anxiety mood disorder,

whereas those who relocated had experienced a 26.4% prevalence of this disorder—both significantly higher than the national average. Patz et al<sup>19</sup> noted that the risk factors included low social capital (network of trusting relationships in one's community) or social support; physical injury; significant loss of property; witnessing injury, illness, or death; loss of family members; displacement; and a past history of mental health/psychiatric illness. Among vulnerable populations, children are at high risk, thus requiring an urgent response from emergency clinicians and mental health professionals.

### Climate Change: Concepts of Mitigation, Adaptation, and Resilience

Three concepts are central to addressing the effect of climate change on human health and well-being: mitigation, adaptation, and resilience. Mitigation refers to slowing the rate of global warming by reducing greenhouse gas emissions. By signing the Paris Agreement, nations acknowledged their commitment to reduce greenhouse gas emissions significantly by the year 2030,<sup>21,22</sup> with the goal of limiting warming to less than 2°C (3.6°F) above preindustrial levels. These governmental efforts were aimed at achieving mitigation of future increases in ambient temperatures and assuring the engagement of countries globally.

Adaptation refers to the measures taken at the individual, local, national, and international levels to reduce risks, and prepare for present and future potential climate impact through efforts aimed at strengthening infrastructure and systems.<sup>23</sup> It is important to note that risk is a function of threat and vulnerability. As noted previously, certain groups are more vulnerable to the negative impact of climate change. The degree to which individuals, communities, or systems are vulnerable is determined by their sensitivity to climate impact, their levels of exposure, and their capacity to adapt to direct climate threats and impact.<sup>24</sup> Ultimately, the goal is to create resilience by addressing these threats to protect the health and well-being of both individuals and communities.

Resilience efforts are aimed at adaptation to current and future climate health impact. An example of efforts to increase resilience is enhancing proactive strategies and education of occupational workers exposed to ambient heat stress to avoid heat stroke. The projected labor cost impact of climate-related ambient heat stress is estimated in trillions of dollars globally<sup>25</sup>—affecting developed as well as developing, fragile economies. Therefore, it is critical for ED clinicians to address, engage, assess, and treat the emerging

dangers for patients related to occupational heat exposure and associated mental health consequences.

### Background of Mental Health Impact of Climate Change

Weather and climate have long been known to have an impact on the mood of individuals, as in seasonal affective disorder.<sup>26</sup> It is also well established that individuals and groups living in regions that experience more severe weather are more likely to experience subsequent symptoms consistent with mood and affective disorders.<sup>17,27,28</sup> Emerging evidence suggests that there are multiple mental health effects of climate change and climate-related events.<sup>11</sup> These impacts can be categorized as acute and chronic mental health impacts related to climate change because of direct or indirect consequences. Further mental health impacts of climate change are linked with conflict, violence, and migration<sup>7</sup>—and disaster response by emergency clinicians for both acute disasters and long-term follow-up is critical.

Acute mental health impacts result from natural disasters and extreme weather events. Trauma and shock can lead to anxiety, depression, phobic and somatic impairment, as well as substance use disorders. Without intervention, people may begin to experience symptoms of post-traumatic stress disorder (PTSD) and increase in suicidality. PTSD is more likely to occur in people who have lost loved ones, property, or things of personal value.<sup>29</sup> Suicides in farmworker populations, particularly during periods of prolonged drought, are increasing in prevalence and are related to climate change<sup>30,31</sup> and food insecurity.<sup>32</sup> With increasing natural disasters and extreme heat events, it is likely that more people will be affected by mental health consequences.

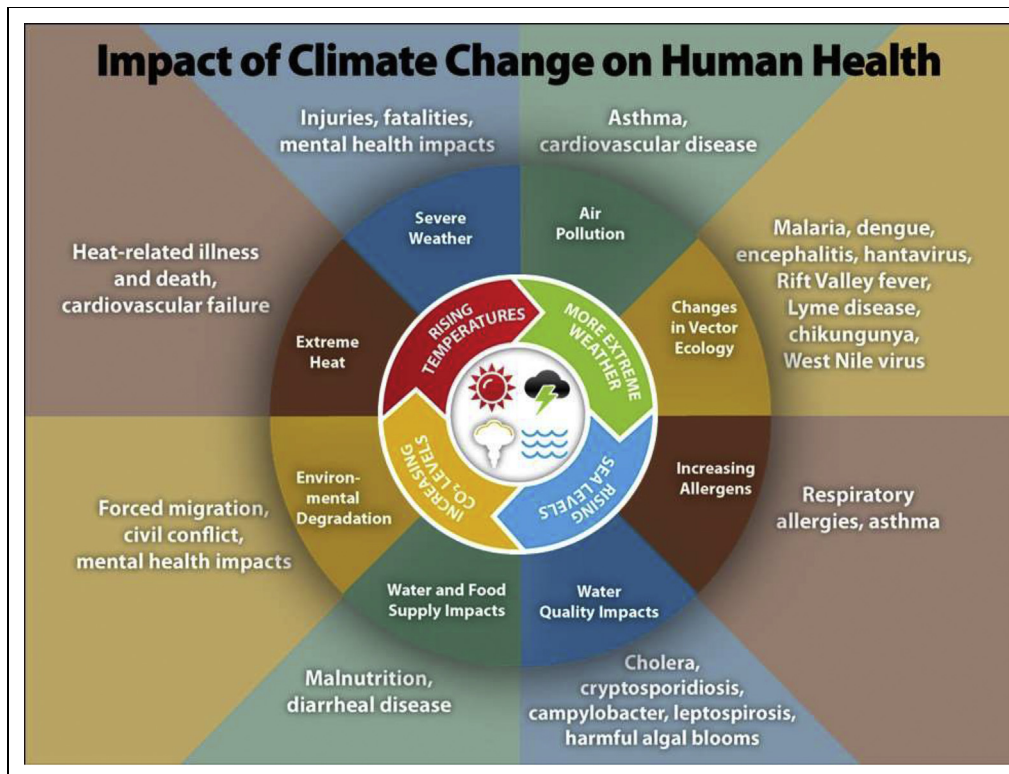
Extreme stress can occur when the effects of existing life stressors are compounded by climate-related stress, which can lead to not only chronic stress and its sequelae, including suicidality, but also to negative physical symptoms such as sleep disorders and immune system compromise, and strained social relationships.<sup>10</sup> One in 3 women and 1 in 7 men experience intimate partner violence (IPV), and 70,000 children per year suffer from maltreatment.<sup>33</sup> The incidence of IPV sexual violence and child maltreatment increases in families who have experienced disaster.<sup>34</sup> The reasons for this increase include parental stress, decreased social support, and economic loss.<sup>35</sup> In addition to facing the risk of maltreatment, children are particularly vulnerable to climate-related mental health impact related to the potential strain on the family/parents/communities because of

climate stress and the potentially devastating interruption in education that may occur. Both can have negative effects on children's social, cognitive, and emotional development.<sup>10</sup>

Chronic impacts on mental health and well-being that are specifically related to rising temperatures include increase in violence, aggression, and mental health emergencies. Aggressive behavior increases as temperatures rise.<sup>36</sup> Likewise, the use of emergency mental health services increases with higher temperatures.<sup>10</sup> Water insecurity, particularly among vulnerable populations, is an increasingly complex problem in certain parts of the world, including sub-Saharan Africa and Southwest Asia. Notably, the spark that ignited the Syrian conflict was a multiyear drought in which arable land was lost affecting farming outputs, with the resultant loss of livestock affecting food and water insecurity. This climate-related complex situation resulted in the subsequent war, the lingering migrant crisis in the Middle East, and further climate and conflict migration to western Europe. Thus, conflict, violence, and migration are critical problems related to climate change globally<sup>7,37</sup> and lead to complex mental health sequelae in emergency settings, with firearm violence as another exemplar.

### Addressing Mental Health Impacts of Climate Change in Emergency Departments: An Interprofessional, Trauma-Informed Approach

The Centers for Disease Control and Prevention<sup>38</sup> has developed an approach to understanding the impact of climate change on human health that can guide nursing, nurse practitioners, physician assistants, and physician practice in emergency settings (Figure). The impacts—all of which may affect mental health sequelae—include injuries, fatalities, and other mental health outcomes related to severe weather; asthma and cardiovascular disease due to air pollution with potential for depressive outcomes and anxiety; changes in vector ecology, that is, mental health outcomes related to Lyme disease and other vector-borne illnesses (encephalitis, hantavirus, and chikungunya—all of which may be associated with intellectual/mental health); respiratory allergies, asthma related to increase in allergens; water quality impacts secondary to cholera, harmful algal blooms, cryptosporidiosis, and leptospirosis; malnutrition and diarrheal disease due to water and food supply impacts/insecurity; conflict and violence—a secondary outcome of environmental degradation as well as heat stress due to climate change; and heat-related illness and death (eg, heat stress,



FIGURE

Impact of climate change on human health. (Reprinted with permission from the Centers for Disease Control and Prevention, 2014).

heat stroke, and cardiovascular failure related to extreme heat).

The Substance Abuse and Mental Health Services Administration describes the concept of trauma as resulting from an event, a series of events, or a set of circumstances that is experienced by an individual, is physically or emotionally harmful or life-threatening, and which has lasting adverse effects on the individual's functioning and mental, physical, social, emotional, or spiritual well-being.<sup>39</sup> The agency's "Four R's" trauma-informed approach to care is a useful framework that can be implemented in an ED setting to care for patients who present with both physical and psychological impacts given the trauma associated with climate-related events. First, all people at all levels of the organization, for instance, a hospital, must have a basic understanding of trauma and how it can affect individuals, families, and communities. This understanding will enable care providers to recognize the signs of trauma. This leads to an organizational response that integrates this deeper understanding of the trauma experience into organizational policies, as well as changes in the language and behavior of those who interact with patients. Last, practicing a

trauma-informed approach includes resisting retraumatization of both patients and staff by practicing the 6 key principles (Table 1), which include safety; trustworthiness and transparency; peer support; collaboration and mutuality; empowerment, voice, and choice; and cultural, historical, and gender issues.<sup>39</sup> Integrating these 6 principles into care can mitigate the mental health impact related to climate-related events. It is essential that ED clinicians realize the mental health impact of climate-related trauma and recognize psychological symptoms related to climate change. Furthermore, ED clinicians must respond to mental health sequelae in those affected by climate-related stressors and resist retraumatization by engaging with the Substance Abuse and Mental Health Services Administration's 6 key principles.

The critical importance of health assessment and physical examination by the ED clinician is key to appropriate diagnosis, treatment, evaluation, and long-term follow-up/referral. In their assessment of mental health impact, emergency nurses must consider the impact of depression, stress, and anxiety; strains on social relationships; complicated grief; substance use (exacerbating mental health impact or

TABLE 1

**Six key principles of a trauma-informed approach**

Key Principle	Definition
Safety	The organization creates a physically and psychologically safe environment for both employees and those they serve.
Trustworthiness and transparency	Organizational decisions are transparent and focused on building and maintaining trust with patients, families, and employees.
Peer support	Using the stories of trauma survivors to promote recovery and healing by establishing safety, hope, and trust, and enhancing collaboration.
Collaboration and mutuality	Partnering and leveling power differences between employees at all levels and those who are served enhances the recognition that everyone has a role in trauma-informed care.
Empowerment, voice, and choice	Recognizing and building on individual strengths of employees and those they serve.
Cultural, historical, and gender issues	Policies and practices are responsive to racial, ethnic, and cultural needs of patients and families. Historical trauma is recognized and addressed.

Reproduced with permission from Substance Abuse and Mental Health Services Administration. SAMHSA's concept of trauma and guidance for a trauma-informed approach. HHS Publication No. (SMA) 14-4884. Rockville, MD: Substance Abuse and Mental Health Services Administration, 2014<sup>39</sup>

resulting from climate-related events); PTSD; loss of personal identity, particularly after extreme weather events and wildfires; and helplessness and fatalism.<sup>10</sup>

After climate-related events, one of the most important considerations for hospital preparedness is the well-documented surge in ED use by patients.<sup>40</sup> Although the physical injuries sustained by patients are more visible, there is also a documented increase in mental health–related visits after a climate-related event—in both the acute and long-term phases after disasters.<sup>41</sup> In 2012, Hurricane Sandy affected the greater New York City area, which led to an increase in mental health–related inpatient and outpatient visits, often with the initial encounter in the emergency department—a trend that continued for several months after the hurricane.<sup>41</sup> Thus, it is clear that ED clinicians must be knowledgeable regarding climate change–related mental health sequelae. Table 2 contains critical elements of care specific to climate-related mental health impacts.

Experiencing disasters related to climate change and weather can cause significant psychological stress and may exacerbate existing mental health conditions or launch new mental health challenges, such as PTSD, anxiety, and depression.<sup>41</sup> Nurses, as well as advanced practice providers—physician assistants, nurse practitioners, and physicians—are trained to assess, diagnose, evaluate, and manage mental health disorders in acute and nonacute care settings. The care provided by nurse practitioners and physician assistants may include a focused history and physical examination, and consultation and collaborative efforts with the ED physician. In the emergency department, while a provider evaluates patients who are emotionally distressed, an

assessment of their mental health profile in the context of climate-related events must be included. Such an assessment is relevant whether it is related to gradual changes or a natural disaster because of the impact it has on the lives of these individuals. It is critical to recognize populations who are at an increased risk and to consider these factors in the overall assessment.

Individuals with pre-existing mental health conditions and those living in low-income communities, immigrants, minorities, older adults, and children are disproportionately vulnerable.<sup>42</sup> Vulnerable individuals who are victims of both gradual and extreme weather events are at an increased risk of anxiety, PTSD, self-harm, and suicidal ideation,<sup>43–45</sup> and are more prone to high-risk coping behaviors and substance abuse.<sup>46</sup> While completing a thorough social history, providers in the emergency department can use brief, validated screening protocols for the emergence of mental health symptoms. Screening tools that can be helpful include the Subjective Units of Distress Scale to measure intensity of distress,<sup>47</sup> universal suicide risk screening,<sup>48</sup> Patient Health Questionnaire–2 for depression,<sup>49</sup> Generalized Anxiety Disorder–2 for anxiety,<sup>50</sup> National Institute of Drug Association screen for substance abuse,<sup>51</sup> National Institute on Alcohol Abuse and Alcoholism screening for alcohol abuse,<sup>52</sup> and Primary Care–PTSD-5 for PTSD.<sup>53</sup>

A comprehensive review of the individual's current medication and assessment of medication adherence and any possible adverse effects in the context of their environmental exposure is important in guiding management and treatment. Emotional stress, restricted access to

TABLE 2

**Elements to address climate-related mental health impacts in the emergency department**

Consider a trauma-informed approach to care

Targeted mental health assessment

Examples of assessment tools focusing on acute and chronic mental health impacts:

Subjective Units of Distress Scale: Intensity of distress

Universal suicide risk screening

PHQ-2: Depression

GAD-2: Anxiety

NIDA: Substance use

PC-PTSD-5: PTSD

Comprehensive medication review

Management of acute symptoms

Targeted discharge planning referral

Referral to community services for follow-up

To mitigate effects of acute psychological impacts (eg, PTSD related to shock and trauma from experiencing a recent disaster)

To ensure continued care of chronic psychological impacts (ongoing depression, anxiety)

PHQ-2, Patient Health Questionnaire-2; GAD-2, Generalized Anxiety Disorder-2; NIDA, National Institute on Drug Abuse; PC-PTSD-5, Primary Care-Posttraumatic Stress Disorder-5.

medications, and financial hardship can exacerbate existing mental illness by impairing one's ability to adhere to medication. Individuals taking psychotropic medication who experience increased exposure to heat may suffer from diminished heat regulation and impaired fluid homeostasis resulting in adverse medical events.<sup>54</sup> It is critical to identify other medications, such as cardiac or diuretic medications, for example, that might exacerbate possible negative hemodynamic adverse effects. Acute interventions and management in the emergency department may include medication recommendations, including administration of medications such as anxiolytics when appropriate. Suicide prevention and close monitoring may be indicated on the basis of a thorough assessment.

An important role of the ED team is to develop a plan for discharge and to identify discharge resources that may include a follow-up with a mental health clinician and referral to case managers and community health workers for long-term follow-up. The ED team should promote access to, and continuity of, mental health treatment through timely referral for further screening, renewal, or initial prescription of psychotropic medications as appropriate, and awareness of national and local mental health resources. The team can serve as a peer-leader in climate health advocacy and patient safety when equipped with the appropriate knowledge and skills.<sup>55</sup>

Climate change-related health literacy of ED clinicians is a critical area for education, clinical practice, scholarship, and policy/advocacy. For example, heat is linked to mental

health-related hospitalizations; therefore, anticipating more ED visits during heat waves, understanding the risks associated with certain psychiatric medications (eg, lithium), and considering how medications may affect thermoregulation are critical areas for further study.

### Integration of Mental Health in Disaster Risk Management Plans

The education of first responders and emergency personnel in the screening process and identification of risks for acute psychological stress and potential for chronic mental health sequelae for climate change are key areas. Early identification, intervention, and referral to community services can reduce the incidence of PTSD.<sup>10</sup> In addition, during or immediately after a disaster, the focus is on safety and attending to physical injury. As an adjunct to the trauma-informed framework, psychological first aid (PFA) can be considered. This early intervention strategy can be used with both climate-related event survivors and first responders and emergency services personnel, and consists of 5 principles of PFA aimed at ensuring that compassionate care is provided. Training first responders and emergency room personnel in PFA may limit long-term mental health trauma from acute events. These principles include promoting a sense of safety, calmness, a positive sense of self, and a sense of self-efficacy, connectedness, and hope.<sup>10,56</sup>

## The Impact of the COVID-19 Pandemic on Mental Health and Well-Being

Aaron Bernstein, MD, MPH, Director of the Center for Climate, Health, and the Global Environment at the Harvard T. H. Chan School of Public Health notes that although there is no direct evidence that climate change is influencing the spread of COVID-19, climate change increases the likelihood of emerging infectious diseases, which could lead to an increased occurrence of future pandemics.<sup>57</sup>

Many of the root causes of climate change lead to changes in the way we interact with the environment and other species. For instance, deforestation leads to a loss of habitat, which in turn forces animal migration. The increased contact between humans and animals increases the likelihood of new and emerging infectious diseases.<sup>57</sup>

As of May 20, 2020, in the United States, there were 1,504,830 cases of COVID-19, the illness caused by severe acute respiratory syndrome coronavirus 2, and 90,340 deaths reported.<sup>58</sup> Globally, there were approximately 4.9 million confirmed cases, and 300,000 deaths.<sup>59</sup> It is well established in disaster mental health literature that emotional distress is pervasive in populations that are affected.<sup>60</sup> Therefore, it follows that the levels of emotional distress may be equally high in a disaster such as the current public health crisis. Groups that are particularly vulnerable to pandemic-related mental health impact include those who contract COVID-19; those with an increased risk for contracting COVID-19; those with pre-existing physical, psychiatric, or substance use disorders; and frontline providers, including health care providers.<sup>60,61</sup>

In an approach similar to that addressing the health impact of climate change, the initial priority was the provision of physical care of those afflicted with COVID-19. As the pandemic evolves, the necessity of addressing the psychological impact is becoming quite clear. The factors related to increased emotional distress include infringement of personal freedom, social isolation, the severity of the illness, job insecurity and financial loss, misinformation, unpredictability, and uncertainty.<sup>60,62</sup> Protracted social isolation can lead to anxiety, mood, or addictive disorder. Moreover, social isolation and subjective feelings of loneliness are associated with a higher risk of suicide.<sup>61</sup> Furthermore, Dettman<sup>33</sup> points out that—much like in climate-related disasters—the pandemic heightens concerns about IPV and child maltreatment at home. Stay-at-home orders are restricting those experiencing violence from accessing traditional support systems such as the health care system or schools. These orders are also preventing those at risk or experiencing violence from escaping an untenable environment of violence. Dettman<sup>33</sup> urges that safe screening

should be built into every interaction, whether in-person or virtual, and that those on the frontlines should have a heightened awareness of this critical public health issue.<sup>33</sup> Moreover, noting that at the peak of the pandemic in China the prevalence of psychological distress in the general population was significantly higher than usual, Hao et al<sup>63</sup> underscore the importance of integrating mental health and psychological support into emergency preparedness and response frameworks at the local, regional, and national levels.

The COVID-19 pandemic has created concern for the mental health and well-being of health care providers. Many of the providers caring for patients who are very ill have minimal mental health training and are susceptible to moral injury resulting from a perceived moral transgression that results in extreme guilt or shame. The contributing factors may include practicing in the face of equipment shortages (personal protective equipment and ventilators); trying to support families of patients who are critically ill and who cannot be with their loved ones; supporting large numbers of patients dying without their loved ones present; caring for sick coworkers; and the fear of exposing their own loved ones. Moral injury can lead to depression, PTSD, and suicidal ideation.<sup>64,65</sup> Administrators must proactively address these mental health impacts to optimize the well-being of frontline staff. Ongoing support and aftercare are important not only for those who continue to work, but also for those who are in isolation or quarantine.<sup>60,64,65</sup>

## Conclusion

Climate change is impacting human health and well-being globally. ED clinicians play a key role in the assessment, identification, early intervention, and care of those experiencing the psychological effects related to climate-related events such as extreme heat, natural disasters, and emerging infectious diseases. Moreover, ED clinicians can play an instrumental role in emergency preparedness to ensure the inclusion of mental health services and channels for community referral. As Kreslake et al<sup>66</sup> note, “As frontline witnesses to the human toll of climate change, health professionals are ideal advocates for collective action toward adaptation and mitigation policies.” Although climate change and the COVID-19 pandemic have not been causally linked, there are significant similarities of the impact of each on mental health and well-being. It is imperative that addressing the mental health impact of climate change becomes a priority and that interventions are fully integrated into emergency and disaster management frameworks to mitigate negative



sequelae and optimize health outcomes during future pandemics and climate-related events.

## Author Disclosures

Conflicts of interest: none to report.

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