



Position Statement

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Mitigating the Effects of Climate Change on Health and Healthcare: The Role of the Emergency Nurse

Description

Earth's climate is changing more rapidly than at any other point in the history of modern civilization and it is largely a result of human activity (American Academy of Pediatrics [AAP], Council on Environmental Health, 2015; Chao & Feng, 2018; Jay et al., 2018; Lovejoy & Hannah, 2019; Pachauri & Meyer, 2014; Ziegler et al., 2017). The impact of climate change is being experienced globally and is projected to intensify in the future (Jay et al., 2018; Pachauri & Meyer, 2014). Climate change affects communities in many ways: the economy, social systems, quality of water, indigenous communities, ecosystems, agriculture and food, infrastructures, oceans and coasts, tourism, human health, and quality of life (Jay et al., 2018; Pachauri & Meyer, 2014; Ziegler et al., 2017).

A contributor to the warming of the climate system is the healthcare sector, accounting for 8% of greenhouse gas emissions in the United States and 4.5% globally (American College of Physicians, 2017; Solomon & LaRocque, 2019; Watts et al., 2019). Greenhouse gas is predominantly a combination of water, carbon dioxide, methane, nitrous oxide, and fluorinated gases (National Center for Environmental Health, 2019). In conjunction with black carbon, these gasses impair the earth's reflective capacity while simultaneously absorbing solar radiation that is re-emitted to Earth's atmosphere, ultimately leading to surface warming (National Center for Environmental Health, 2019). Climate warming is associated with more frequent and severe storms, intense heat, drought, worsening air quality, and changes in the distribution of pathogens (Ghazali et al., 2018; Khan et al., 2019; National Center for Environmental Health, 2019; Ruszkiewicz et al., 2019; The National Academies of Science Engineering Medicine, 2020; United States Global Change Research Program, 2018; Watts et al., 2019). Water scarcity, land degradation, and desertification also have accelerated in the past century due to natural disasters, environmental pollution, and destruction of green space (American Society of Landscape Architects, 2020; European Environmental Agency, 2019; Food and Agriculture Organization of the United Nations, 2019; Ghazali et al., 2018; Health Care Without Harm, n.d.; World Health Organization, 2020b). More frequent and intense extreme weather and climate-related events, as well as changes in average climate conditions, are expected to damage infrastructure, ecosystems, and social systems that provide essential benefits to communities.

The physical environment where people live, learn, work, and play, which is impacted by climate warming, is a social determinant of health (Castner et al., 2019; Office of Disease Prevention and Health Promotion, n.d.). Future climate change is expected to further disrupt many aspects of life, posing challenges to those most vulnerable populations including children, older adults, pregnant women, immigrants, lower-income and marginalized communities, and those with comorbidities (e.g., immunocompromised, allergies, respiratory disease) who have a lower capacity to prepare for and cope with extreme weather and



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climate-related events (AAP, Council on Environmental Health, 2015; American Medical Association, 2019; Gamble et al., 2016; Haines & Ebi, 2019; Jay et al., 2018; Pachauri & Meyer, 2014; Watts et al., 2019; Ziegler et al., 2017).

Ambient air pollution contributes to 4.2 million premature deaths worldwide and is associated with increased morbidity from numerous illnesses (Castner & Polivka, 2018; World Health Organization, 2020a). More than 90% of children are subjected to fine particulate matter that exceeds health standards, while maternal exposure is associated with an increase in preterm births (The Medical Society Consortium on Climate & Health, 2020). Poor air quality also leads to emergency visits for asthma, chronic obstructive pulmonary disease, cardiovascular events, and mental health complaints (Castner & Polivka, 2018; Ghazali et al., 2018; Haines & Ebi, 2019; Szyszkowicz et al., 2018; Watts et al., 2019; World Health Organization, 2020a). In 2018, a record number of older adults (220 million) were exposed to at least one heatwave (Watts et al., 2019), with exposure to the stress of extreme heat causing nephropathy, electrolyte disturbances, cerebrovascular events, congestive heart failure, and preterm births (Ghazali et al., 2018; Holden, 2019; The Medical Society Consortium on Climate & Health, 2020; Watts et al., 2019). Psychological stress due to displacement, socioeconomic consequences, and exposure to trauma is anticipated to rise with the increased prevalence of climate-related natural disasters (Ghazali et al., 2018). Providing education to patients and their families on climate change and disaster readiness may help them prepare and mitigate these consequences.

The severity of the impact of future climate change will depend fundamentally on action taken to reduce greenhouse gas emissions and adapt to anticipated changes (AAP, Council on Environmental Health, 2015; Pachauri & Meyer, 2014; Jay et al., 2018). Without proactive action and substantial changes, climate-related risks will continue to grow. According to the World Health Organization (2002a), climate change can be mitigated by transitioning to sustainable and efficient energy practices, conserving and protecting resources, designing climate-resilient infrastructure, and adopting methods of sustainable waste disposal and management practices. The emergency nurse can serve as a voice to mitigate climate change through advocacy, research, patient education, and community educational programs. In addition, the emergency nurse has various opportunities to engage others to assist in adaptation and mitigation strategies, increase awareness regarding the impact of climate change and health, support climate-friendly practices and initiatives in healthcare, and join others in the call for immediate action on climate change.

ENA Position

It is the position of the Emergency Nurses Association (ENA) that:

1. Climate change is a global public health problem.
2. Global action to significantly reduce greenhouse gas emissions can substantially reduce climate-related risks.



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3. Emergency nurses advocate to promote nursing educational opportunities and research regarding the effects of climate change on the environment and human health.
4. Emergency nurses provide evidence-based discharge education to patients and their families on relevant climate change related disaster readiness to increase their awareness of the threats and prevention strategies.
5. Emergency nurses and administrators lead initiatives to explore and implement strategies to design and redesign healthcare facilities to reduce carbon emissions and the environmental impact.
6. Emergency nurses, administrators, and healthcare facilities seek ways to increase energy efficiency, reduce waste, incorporate renewable energy, and help build collaborative opportunities within the community to address climate change.

Background

The Intergovernmental Panel on Climate Change defines climate change as a transformation in the state of the climate that continues for an extended period and can be recognized by the variability of its properties (Pachauri & Meyer, 2014; Pachauri & Resinger, 2007). It also can be considered to be *any* change in climate over time, whether a result of natural changes or consequence of human activity. Climate change is a global health problem that requires collaboration across various sectors to promote community climate resilience and sustainable, long-term transformation (American Public Health Association, 2018). The heat-trapping nature of carbon dioxide and other greenhouse gases has been recognized since the 1800s as being a large contributor to climate change (Pachauri & Meyer, 2014). Human activities such as fossil fuel emissions and land use changes such as deforestation have caused a rapid acceleration in the atmospheric concentration of greenhouse gases (Climate Institute, 2019; Environmental and Energy Study Institute, 2019; United States Environmental Protection Agency [EPA], 2019b; National Aeronautics and Space Administration 2019; Nunez, 2019; Pachauri & Meyer, 2014; Tong & Ebi, 2019; Wolff, et al. 2018; Wood & Roelich, 2019). Scientists continue to observe climbing temperatures over the past century, which are attributed to changes in greenhouse gas concentrations. These effects of climate disruption are fundamental health issues and pose existential risks to everyone.

Heat waves have become more frequent and prolonged, and the number of extreme cold waves has increased. Extreme heat has been associated with an increased risk of morbidity and mortality (Gasparrini



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et al., 2015; Kang, et al., 2016). Kang et al. (2016) found that heat waves were significantly associated with increased risk of out-of-hospital cardiac arrest events during the afternoon when temperatures were at their highest. Other researchers have shown that thermoregulatory mechanisms are impaired in the elderly, as well as those with chronic illnesses like diabetes, hypertension, and congestive heart failure (Balmain et al., 2018; Kang et al., 2016; Kenney et al., 2014). Globally, there has been a shrinkage of glaciers, decreasing the mass of the Greenland and Antarctic ice sheets. The sea level has risen because of these melting glaciers and thermal expansion of warmer water (Lindsey, 2019). As the Earth's climate continues to change, helping to adjust the daily health behaviors including mediating effects of risk perception of patients will be an important public health intervention for emergency nurses.

Climate change has led to various temperature anomalies (Ban et al., 2019). Warmer air holds more moisture and contributes to an increase in heavy precipitation in some areas. Conversely, drier regions, like the Southwest United States have experienced drought. While extreme heat and droughts are not uncommon for certain areas like East Africa, droughts in this region have become drier and much hotter than usual impacting farming, health, humanitarian efforts, and resettlement (Oxfman, 2017). These outcomes remain consistent with projections that wet regions will become wetter and drier regions will become drier.

With the anticipation of more flooding, emergency nurses can expect to see increased drownings, heart attacks, hypothermia, blunt trauma caused by wind-borne objects, vehicle-related crashes, snakebites, electrocutions, wound infections, and water-borne diseases (Fitzgerald et al., 2019; Vanasse et al., 2016; Wright et al., 2019; Yadav et al., 2019). Intensity of hurricanes and frequency of wildfires are both additional examples of the changing climate (Center for Climate and Energy Solutions, 2019). While the annual number of wildfires varies, the overall number of acres of burned acres is increasing (Congressional Research Service, 2020), which leads to increased air particulates and smoke exposure causing increased respiratory illnesses and emergency department visits (CDC, 2020; de Jesus et al., 2020; United States EPA, 2019c). In addition, particulate air pollutants released by burning fossil fuels are shortening human life in many regions of the world. Psychological stress, political instability, forced migration, and conflict are other unsettling consequences. Those most vulnerable such as chronically ill and underprivileged individuals will be most impacted by the devastating consequences (Solomon & LaRocque, 2019).

Emergency nurses can help to increase awareness of and mitigate the effects of climate change through research, education, and community outreach. Energy optimization is one strategy for reducing carbon emissions. For example, emergency care settings can upgrade to energy-efficient equipment, replace incandescent light bulbs with LED bulbs, and install lighting control systems such as occupancy sensors



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(American College of Emergency Physicians, 2017; American Medical Association, 2019; Centers for Disease Control and Prevention [CDC], Office of Sustainability, 2018; Health Care Environmental Resource Center, n.d.; Health Care Without Harm, n.d.; United States EPA, 2017; United States Global Change Research Program, 2018). Use of renewable and alternative energy sources (e.g., solar-powered photovoltaic, water pumps, wind, biomass) are additional means of reducing fossil fuel use (American College of Physicians, 2017; CDC, Office of Sustainability, 2018; United States EPA, 2017; United States Department of Energy, 2020; United States Global Change Research Program, 2018). Combined heat and power technology is another alternative; this technology captures excess heat from electricity generation and uses it for thermal energy (American College of Physicians, 2017). Energy production is not the only source of carbon emission: more than half of the nitrogen oxides emitted globally are from fuels used for transportation (Watts et al., 2019). Using locally sourced food and on-site food production (e.g., rooftop gardens) hospital cafeterias and catering are methods of reducing emissions from transporting supplies while modeling sustainable food practices (American Medical Association, 2019; United States Global Change Research Program, 2018; Watts et al., 2019). Emergency care settings can further reduce transport emissions by supporting staff use of environmentally conscious forms of transport (e.g., cycling) and advocating for vehicles (e.g., ambulances) that use alternative fuel, are electric, or have zero-emissions (Celis-Morales et al., 2017; Ghazali et al., 2018). Emergency nurse leaders can incorporate climate resilient solutions into facility renovation and future design (CDC, Office of Sustainability, 2018; Ghazali et al., 2018; Watts et al., 2019). For example, consideration of landscape features that reduce thermal stresses, use passive cooling and lighting techniques (Food and Agriculture Organization of the United Nations, 2019; Hussain et al., 2019; Watts et al., 2019), and install green roofs or reflective roofs to reduce the heat-island effect (CDC, Office of Sustainability, 2018; Health Care Without Harm, n.d.; The National Academies of Science Engineering Medicine, 2020; The White House, 2015; United States EPA, 2020c; United States Global Change Research Program, 2018; World Health Organization, 2015). Facilities can protect and conserve water by transitioning to water-efficient equipment (e.g., low flow faucets and toilets), adopting water-recycling procedures (e.g., rainwater harvesting for landscape irrigation), and mitigating potential contamination of water sources (American Society of Landscape Architects, 2020; CDC, Office of Sustainability, 2018; Food and Agriculture Organization of the United Nations, 2019; The National Academies of Sciences, Engineering, and Medicine, 2020; United States EPA, 2020d; United States Global Change Research Program, 2018; World Health Organization., 2015). Bioswales, aquifer storage and recovery, and desalination are examples of sustainable stormwater management practices (American Society of Landscape Architects, 2020; United States EPA, 2019a; World Health Organization, 2020b). Chemicals used interiorly (e.g., cleaning supplies) and exteriorly (e.g., pesticides and herbicides) also can negatively affect water and soil quality. Adopting integrated groundskeeping practices aimed at reducing the use of environmentally



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harmful chemicals is one approach to mitigating soil and water contamination (The Joint Commission, 2020; United States EPA, 2020d; United States Global Change Research Program, 2018).

Sustainable waste management is necessary to preserve resources and reduce greenhouse gas emissions (Watts et al., 2019). Examples of sustainable approaches include reusing and recycling of industrial materials; composting; using alternative waste management technology (e.g., anaerobic digestion of organic waste); and disposing of electronics in environmentally conscientious ways (e.g., reusing, refurbishing, or recycling materials) (American College of Emergency Physicians, 2018; Health Care Without Harm, n.d.; The Joint Commission, 2020; United States Global Change Research Program, 2018; U.S. Department of Health and Human Services, n.d. 2019; United States EPA, 2019a, 2020b; Watts et al., 2019). Emergency departments also have the opportunity to reduce general (non-hazardous) and regulated waste. Regulated waste may be infectious, pathological (human tissues), sharps, chemical (e.g., disinfectants, batteries, solvents), pharmaceutical (e.g., expired, unused, or contaminated drugs), and cytotoxic (waste with genotoxic properties) (The Joint Commission, 2020). Pharmaceutical management and disposal is a significant area of opportunity for reducing waste and preventing environmental contamination (Alnahas et al., 2020). Pharmaceutical take-back programs are one way organizations are already combatting this issue that could be further expanded (Alnahas et al., 2020; National Conference of State Legislatures, 2018). Emergency care settings also can adopt processes that promote efficient pharmaceutical use such as reducing storage redundancy and modifying purchasing habits (e.g., use of therapeutic alternatives, selecting two-part polyolefin intravenous devices that weigh up to one-third less) (CDC, Office of Sustainability, 2018; Health Care Environmental Resource Center, n.d., 2008).

Integrating environmental health into nursing and educating emergency nurses on climate change are important components of the reduction of healthcare's carbon footprint (American Medical Association, 2019; Castner et al., 2019; Ghazali et al., 2018; Haines & Ebi, 2019; Health Care Without Harm, n.d.). Emergency nurses can positively influence practice by supporting policies related to climate change, modeling healthy behaviors that promote sustainability, and taking measures to minimize waste (American College of Emergency Physicians, 2018; Castner et al., 2019; Ghazali et al., 2018; Haines & Ebi, 2019; Solomon & LaRocque, 2019; The National Academies of Science Engineering Medicine, 2020; United States Global Change Research Program, 2018; World Health Organization, 2020a). Emergency nurses are also in the unique position of being able to educate patients and families on environmentally safe ways to dispose of regulated waste (e.g. unused medication, medical supplies).

Unfortunately, climate change is not universally accepted as a public health hazard by healthcare professionals in the United States despite being one of the greatest global health threats of this century



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(Chan, 2018; Ziegler, 2017). It is important for emergency nurses to increase their understanding of the health threats associated with climate in order to assist in recognizing and anticipating climate-associated effects and become more engaged in the development and effective implementation of prevention, mitigation, and adaptation strategies.

Resources

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Developed: 2020.

Approved by the ENA Board of Directors: December 2020.

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