



Position Statement

930 E. Woodfield Road, Schaumburg, IL 60173 | 800.900.9659 | ena.org

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; Watts et al., 2019). Climate change affects communities in many ways: the economy, social systems, quality of water, 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 major 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). The main greenhouse gases responsible for climate change are 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). Rising global temperatures are 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; Ruskiewicz 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 rising global temperatures, 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, some communities of color, immigrants, lower-income and under-resourced 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 climate-related events (AAP, Council on Environmental

Position Statement

930 E. Woodfield Road, Schaumburg, IL 60173 | 800.900.9659 | ena.org

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, low birth weight and stillbirths (Bekkar et al., 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 and policies that support climate adaptation and mitigation.

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.



Position Statement

930 E. Woodfield Road, Schaumburg, IL 60173 | 800.900.9659 | ena.org

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 and reduce chronic disease exacerbations.
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 the burning of fossil fuels 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 a changing climate are linked to 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



Position Statement

930 E. Woodfield Road, Schaumburg, IL 60173 | 800.900.9659 | ena.org

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 under resourced communities 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



Position Statement

930 E. Woodfield Road, Schaumburg, IL 60173 | 800.900.9659 | ena.org

(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) 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



Position Statement

930 E. Woodfield Road, Schaumburg, IL 60173 | 800.900.9659 | ena.org

affect water and soil quality. Adopting integrated groundskeeping practices aimed at reducing the use of environmentally 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





Position Statement

930 E. Woodfield Road, Schaumburg, IL 60173 | 800.900.9659 | ena.org

(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

American College of Physicians. (2017). Reduce your facility's energy use (operations).

https://www.acponline.org/system/files/documents/advocacy/advocacy_in_action/climate_change_toolkit/energy_management.pdf

Energy Star (n.d.). Commercial buildings. <https://www.energystar.gov/buildings/about-us/howcan-we-help-you/build-energy-program/guidelines>

Reidmiller, D. R., Avery, C. W., Easterling, D. R., Kunkel, K. E., Lewis, K. L. M., Maycock, T. K., & Stewart, B. C. (Eds.) (2018). Impacts, risks, and adaptation in the United States: Fourth national climate assessment, Volume II. U.S. Global Change Research Program <https://doi.org/10.7930/NCA4.2018>

United States Department of Energy. (2020). Federal energy management program.

<http://energy.gov/eere/femp/federal-energy-management-program>

References

Alnahas, F., Yeboah, P., Fliedel, L., Abdin, A. Y., & Alhareth, K. (2020). Expired medication: Societal, regulatory and ethical aspects of a wasted opportunity. *International Journal of Environmental Research and Public Health*, 17(3), Article 787. <https://doi.org/10.3390/ijerph17030787>

American Academy of Pediatrics, Council on Environmental Health. (2015). Global climate change and children's health. *Pediatrics*, 136(5), 992–997. <https://doi.org/10.1542/peds.2015-3232>

American College of Emergency Physicians. (2018). Impact of climate change on public health and implications for emergency medicine [Policy statement]. <https://www.acep.org/patient-care/policy-statements/impact-of-climate-change-on-public-health-and-implications-for-emergency-medicine/>

American College of Physicians. (2017). Reduce your facility's energy use (operations). https://www.acponline.org/system/files/documents/advocacy/advocacy_in_action/climate_change_toolkit/energy_management.pdf

American Medical Association. (2019). Global climate change and human health H-1.35.938 (Policy statement). <https://policysearch.ama-assn.org/policyfinder/detail/climate%20change?uri=%2FAMADoc%2FHOD.xml-0-309.xml>

American Public Health Association. (2018). APHA's climate change and health needs assessment. https://www.apha.org/-/media/files/pdf/topics/climate/needs_assessment.ashx?la=en&hash=029B821EF6EB26E013F877887ACF2FDA8E2D6E6A

American Society of Landscape Architects. (2020). Improving water efficiency: Residential bioswales and bioretention ponds. <https://www.asla.org/bioswales.aspx>

Position Statement

930 E. Woodfield Road, Schaumburg, IL 60173 | 800.900.9659 | ena.org

- Balmain, B. N., Sabapathy, S., Louis, M., & Morris, N. R. (2018). Aging and thermoregulatory control: The clinical implications of exercising under heat stress in older individuals. *BioMed Research International*, 2018, Article 8306154. <https://doi.org/10.1155/2018/8306154>
- Ban, J., Shi, W., Cui, L., Liu, X., Jiang, C, Han, L, Wang, R., & Li, T. (2019). Health-risk perception and its mediating effect on protective behavioral adaption to heat waves. *Environmental Research*, 172, 27–33. <https://doi.org/10.1016/j.envres.2019.01.006>
- Bekkar B, Pacheco S, Basu R, DeNicola N. Association of Air Pollution and Heat Exposure With Preterm Birth, Low Birth Weight, and Stillbirth in the US: A Systematic Review. *JAMA Netw Open*. 2020 Jun 1;3(6):e208243. doi: 10.1001/jamanetworkopen.2020.8243. Erratum in: *JAMA Netw Open*. 2020 Jul 1;3(7):e2014510. PMID: 32556259; PMCID: PMC7303808.
- Castner, J. & Polivka, B. (2018). Nursing practice and particulate matter exposure. *American Journal of Nursing*, 118(8), 52-56. <https://doi.org/10.1097/01.NAJ.0000544166.59939.5f>
- Castner, J., Amiri, A., Rodriguez, J., Huntington-Moskos, L., Thompson, L. M., Zhao, S., & Polivka, B. (2019). Advancing the symptom science model with environmental health. *Public Health Nursing*, 36(5), 716–725. <https://doi.org/10.1111/phn.12641>
- Celis-Morales, C. A., Lyall, D. M., Welsh, P., Anderson, J., Steell, L., Yibing, G., Maldonado, R., Mackay, D. F., Pell, J. P., & Sattar, N. (2017). Association between active commuting and incident cardiovascular disease, cancer, and mortality: Prospective cohort study, *BMJ*, 357, Article j1456. <https://doi.org/10.1136/bmj.j1456>
- Center for Climate and Energy Solutions. (2019). Hurricanes and climate change. <https://www.c2es.org/content/hurricanes-and-climate-change/>
- Centers for Disease Control and Prevention. (2020, June 18). Climate and health: Wildfires. <https://www.cdc.gov/climateandhealth/effects/wildfires.htm>
- Centers for Disease Control and Prevention, Office of Sustainability. (2018). Sustainability. <https://www.cdc.gov/sustainability/index.htm>
- Chan, E. Y. (2018). Climate change is the world's greatest threat – In Celsius or Fahrenheit? *Journal of Environmental Psychology*, 60, 21–26. <https://doi.org/10.1016/j.jenvp.2018.09.002>
- Chao, Q. & Feng, A. (2018). Scientific basis of climate change and its response. *Global Energy Interconnection*, 1(4), 420–427. <https://doi.org/10.14171/j.2096-5117.qei.2018.04.002>
- Climate Institute. (2019). Deforestation and climate change. <http://climate.org/deforestation-and-climate-change/>
- Congressional Research Service. (2020, October 1). Wildfire statistics. <https://fas.org/sqp/crs/misc/IF10244.pdf>
- De Jesus, A. L., Thompson, H., Knibbs, L. D., Kowalski, M., Cyrys, J., Niemi, J. V., ..., Morawska, L. (2020). Long-term trends in PM_{2.5} mass and particle number concentrations in urban air: The impacts of mitigation measures and extreme events due to changing climates. *Environmental Pollution*, 263, article 114500. <https://doi.org/10.1016/j.envpol.2020.114500>
- Environmental and Energy Study Institute. (2019). Fossil fuels. <https://www.eesi.org/topics/fossil-fuels/description>
- European Environmental Agency (2019). Soil, land, and climate change. <https://www.eea.europa.eu/signals/signals-2019-content-list/articles/soil-land-and-climate-change#:~:text=Climate%20change%20affects%20soil&text=Continuing%20declines%20in%20soil%20moisture,dramatic%20impacts%20on%20food%20production>
- FitzGerald, G., Toloo, G. S., Baniahmadi, S., Crompton, D., & Tong, S. (2019). Long-term consequences of

Position Statement

930 E. Woodfield Road, Schaumburg, IL 60173 | 800.900.9659 | ena.org

- flooding: A case study of the 2011 Queensland floods. *Australian Journal of Emergency Management*, 34(1), 35-40.
- Food and Agriculture Organization of the United Nations. (2019). Water scarcity – One of the greatest challenges of our time. <http://www.fao.org/fao-stories/article/en/c/1185405/>
- Gamble, J. L., Balbus, J., Berger, M., Bouye, K., Campbell, V., Chief, K., Conlon, K., Crimmins, A., Flanagan, B., Gonzalez-Maddux, C., Hallisey, E., Hutchins, S., Jantarasami, L., Khoury, S., Kiefer, M., Kolling, J., Lynn, K., Manangan, A., McDonald, M., . . . Wolkin, A. F. (2016). Populations of concern. In A. Crimmins, J. Balbus, J. L. Gamble, C. B. Beard, J. E. Bell, D. Dodgen, R. J. Eisen, N. Fann, M. D. Hawkins, S. C. Herring, L. Jantarasami, D. M. Mills, S. Saha, M. C. Sarofim, J. Trtanj, & L. Ziska (Eds.). *The impacts of climate change on human health in the United States: A scientific assessment* (pp. 247–286). U.S. Global Change Research Program. <https://doi.org/10.7930/J0Q81B0T>
- Gasparri, A., Guo, Y., Hashizume, M., Lavigne, E., Zanobetti, A., Schwartz, J., Tobias, A., Tong, S., Rocklöv, J., Forsberg, B., Leone, M., De Sario, M., Bell, M. L., Guo, Y. L., Wu, C. F., Kan, H., Yi, S. M., de Sousa Zanotti Stagliorio Coelho, M., Saldiva, P. H., Honda, Y., ... Armstrong, B. (2015). Mortality risk attributable to high and low ambient temperature: A multicountry observational study, *The Lancet*, 386(9991) 369–375. [https://doi.org/10.1016/s0140-6736\(14\)62114-0](https://doi.org/10.1016/s0140-6736(14)62114-0)
- Ghazali, D. A., Guericolas, M., Thys, F., Sarasin, F., Gonzalez, P. A., & Casalino, E. (2018). Climate change impacts on disaster and emergency medicine focusing on mitigation disruptive effects: An international perspective. *International Journal of Environmental Research and Health*, 15(7), Article 1379. <https://doi.org/10.3390/ijerph15071379>
- Haines, A., & Ebi, K. (2019). The imperative for climate action to protect health. *The New England Journal of Medicine*, 380, 263–273. <https://doi.org/10.1056/NEJMr1807873>
- Health Care Environmental Resource Center. (2008). Pharmaceutical waste: A 10-step blueprint for healthcare facilities in the United States. <http://www.hercenter.org/hazmat/tenstepblueprint.pdf>
- Health Care Environmental Resource Center. (n.d.). Pharmaceuticals – hazardous waste. <https://www.hercenter.org/hazmat/pharma.php>
- Health Care Without Harm. (n.d.) Climate change, health, and health care: How physicians can help.. <https://noharm-uscanada.org/sites/default/files/Climate.Physician.Network.pdf>
- Holden, E. (2019, September 16). Climate change is having widespread health impacts. *Scientific American*. <https://www.scientificamerican.com/article/climate-change-is-having-widespread-health-impacts/>
- Hussain, M., Butt, A. R., Uzma, F., Ahmad, R., Irshad, S., Rehman, A., & Yousaf, B. (2019). A comprehensive review of climate change impacts, adaptation, and mitigation on environmental and natural calamities in Pakistan. *Environmental Monitoring and Assessment*, 192 Article 48. <https://doi.org/10.1007/s10661-019-7956-4>
- Jay, A., Reidmiller, D., Avery, C. W., Barrie, D., Dave, A., DeAngelo, B. J., Dzaugis, M., Kolian, M., Lewis, K., Reeves, K., & Winner, D. (2018). Overview. In Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (Eds.), *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* (pp. 33–71). U.S. Global Change Research Program. <https://doi.org/10.7930/NCA4.2018.CH1>
- Kang, S. H., Oh, I. Y., Heo, J., Lee, H., Kim, J., Lim, W. H., Cho, Y., Choi, E. K., Yi, S. M., Sang, D., Kim, H., Youn, T. J., Chae, I. H., & Oh, S. (2016). Heat, heat waves, and out-of-hospital cardiac arrest. *International Journal of Cardiology*, 221, 232–237. <https://doi.org/10.1016/j.ijcard.2016.07.071>

Position Statement

930 E. Woodfield Road, Schaumburg, IL 60173 | 800.900.9659 | ena.org

- Kenney, W. L., Craighead, D. H., & Alexander, L. M. (2014). Heat waves, aging, and human cardiovascular health. *Medicine and Science in Sports and Exercise*, 46(10), 1891–1899.
<https://doi.org/10.1249%2FMSS.0000000000000325>
- Khan, M. D., Thi-Vu, H. H., Lai, Q. T., & Ahn, J. W. (2019). Aggravation of human diseases and climate change nexus. *International Journal of Environmental Research and Public Health*, 16(15), Article 2799.
<https://doi.org/10.3390/ijerph16152799>
- Lindsey, R. (2019, November 19). Climate change: Global Sea level. Climate.gov. <https://www.climate.gov/news-features/understanding-climate/climate-change-global-sea-level>
- Lovejoy, T. E., & Hannah, L. (2019). *Biodiversity and climate change*. Yale University Press.
- National Aeronautics and Space Administration. (2019). The causes of climate change.
<https://climate.nasa.gov/causes/>
- National Center for Environmental Health. (2019). Environmental health topics. <https://www.cdc.gov/nceh/>
- National Conference of State Legislatures. (2018). State prescription drug return, reuse and recycling laws.
<https://www.ncsl.org/research/health/state-prescription-drug-return-reuse-and-recycling.aspx>
- Nunez, C. (2019). Climate 101: Deforestation. <https://www.nationalgeographic.com/environment/global-warming/deforestation/>
- Office of Disease Prevention and Health Promotion. (n.d.). Neighborhood and built environment.
<https://health.gov/healthypeople/objectives-and-data/browse-objectives/neighborhood-and-built-environment>
- Oxfam. (2017). A climate in crisis. <https://www-cdn.oxfam.org/s3fs-public/mb-climate-crisis-east-africa-drought-270417-en.pdf>
- Pachauri, R. K. & Meyer, L. A. (Eds.). (2014). *Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Intergovernmental Panel on Climate Change. <https://www.ipcc.ch/report/ar5/syr/>
- Pachauri, R. K. & Resinger, A. (Eds.). (2007). *Climate change 2007: Synthesis report. Contribution of working groups I, II and III to the fourth assessment report of the Intergovernmental Panel on Climate Change, 2007*. Intergovernmental Panel on Climate Change.
http://www.ipcc.ch/publications_and_data/ar4/syr/en/contents.html
- Ruszkiewicz, J. A., Tinkov, A. A., Skalny, A. V., Siokas, V., Dardiotis, E., Rsatsakis, A., Bowman, A. B., da Rocha, B. T., & Aschner, M. (2019). Brain diseases in changing climate. *Environmental Research*, 177, Article 108637.
<https://doi.org/10.1016/j.envres.2019.108637>
- Solomon, C. G., & LaRocque, R. C. (2019). Climate change – A health emergency. *New England Journal of Medicine*, 380, 209–211. <https://doi.org/10.1056/NEJMp1817067>
- Szyszkowicz, M., Kousha, T., Castner, J., & Dales, R. (2018). Air pollution and emergency department visits for respiratory diseases: A multi-city case crossover study. *Environmental Research*, 163, 263–269.
<https://doi.org/10.1016/j.envres.2018.01.043>
- The Joint Commission. (2020). Regulated waste – OSHA definition 2020 [FAQ entry].
<https://www.jointcommission.org/en/standards/standard-faqs/hospital-and-hospital-clinics/environment-of-care-ec/000001237/>
- The Medical Society Consortium on Climate & Health. (2020). International Federation of Gynecology and Obstetrics: Statement on the climate crisis and health [Policy statement].
<https://medsocietiesforclimatehealth.org/medical-society-policy-statements/international-federation->



Position Statement

930 E. Woodfield Road, Schaumburg, IL 60173 | 800.900.9659 | ena.org

[gynecology-obstetrics-statement-climate-crisis-health/](#)

- The National Academies of Sciences, Engineering, Medicine. (2020). Climate change: Evidence and causes –Update 2020. The National Academies Press. <https://www.nap.edu/catalog/25733/climate-change-evidence-and-causes-update-2020>
- The White House, Office of the Press Secretary. (2015). Executive order — Planning for federal sustainability in the next decade. <https://obamawhitehouse.archives.gov/the-press-office/2015/03/19/executive-order-planning-federal-sustainability-next-decade>
- Tong, S., & Ebi, K. (2019). Preventing and mitigating health risks of climate change. Environmental Research, 174. 9–13. <https://doi.org/10.1016/j.envres.2019.04.012>
- U.S. Department of Health and Human Services. (n.d.). HHS Sustainable and Climate Resilient Health Care Facility Initiative: SCRHCFI checklist composite. https://toolkit.climate.gov/sites/default/files/SCRHCFI%20Checklist%20Composite_Form.pdf
- U.S. Department of Health and Human Services. (2019). 2019 sustainability report and implementation plan. <https://www.sustainability.gov/pdfs/hhs-2019-sustainability-plan.pdf>
- United States Department of Energy. (2020). Federal energy management program. <http://energy.gov/eere/femp/federal-energy-management-program>
- United States Environmental Protection Agency. (2017). Green engineering. <https://www.epa.gov/green-engineering>
- United States Environmental Protection Agency. (2019a). Cleaning up electronic waste (E-waste). <https://www.epa.gov/international-cooperation/cleaning-electronic-waste-e-waste>
- United States Environmental Protection Agency. (2019b). Greenhouse gas emissions: Sources of greenhouse gas emissions. <https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions>
- United States Environmental Protection Agency. (2019c). Wildland fire research: Health effects research. <https://www.epa.gov/air-research/wildland-fire-research-health-effects-research>
- United States Environmental Protection Agency. (2020a, January). Sustainable management of electronics. <https://www.epa.gov/smm-electronics>
- United States Environmental Protection Agency. (2020b, May). Sustainable management of food. <https://www.epa.gov/sustainable-management-food>
- United States Environmental Protection Agency. (2020c, June). Sustainable materials management (SMM). <https://www.epa.gov/smm>
- United States Environmental Protection Agency. (2020d, July). Sustainable water infrastructure. <https://www.epa.gov/sustainable-water-infrastructure/water-efficiency-water-suppliers>
- United States Global Change Research Program. (2018). Sustainable and climate-resilient health care facilities toolkit. <https://toolkit.climate.gov/tool/sustainable-and-climate-resilient-health-care-facilities-toolkit>
- Vanasse, A., Cohen, A., Courteau, J., Bergeron, P., Dault, R., ..., Chebana, F. (2016). Association between floods and acute cardiovascular diseases: A population-based cohort study using a Geographic Information System approach. International Journal of Environmental Research and Public Health, 13, 168. <https://doi.org/10.3390/ijerph13020168>
- Watts, N., Amann, M., Arnell, N., Ayeb-Karlsson, S., Belesova, K., Boykoff, M., Byass, P., Cai, W., Campbell-Lendrum, D., Capstick, S., Chambers, J., Dalin, C., Daly, M., Dasandi, N., Davies, M., Drummond, P., Dubrow, R., Ebi, K. L., Eckelman, M., Ekins, P., . . . Montgomery, H. (2019). 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. The Lancet, 394(10211), 1836–1878. [https://doi.org/10.1016/S0140-6736\(19\)32596-6](https://doi.org/10.1016/S0140-6736(19)32596-6)



Position Statement

930 E. Woodfield Road, Schaumburg, IL 60173 | 800.900.9659 | ena.org

- Wolff, N. H., Masuda, Y. J., Meijaard, E., Wells, J. A., & Game, E. T. (2018). Impacts of tropical deforestation on local temperature and human well-being perceptions. *Global Environmental Change*, 52, 181–189. <http://doi.org/10.1016/j.gloenvcha.2018.07.004>
- Wood, N. & Roelich, K. (2019). Tensions, capabilities, and justice in climate change mitigation of fossil fuels. *Energy Research & Social Science*, 52, 114–122. <https://doi.org/10.1016/j.erss.2019.02.014>
- World Health Organization (Eds.). (2015). Operational framework for building climate-resilient health systems. <https://www.who.int/globalchange/publications/building-climate-resilient-health-systems/en/>
- World Health Organization. (2020a). Climate change and human health – risks and responses. Summary. <https://www.who.int/globalchange/summary/en/index9.html>
- World Health Organization. (2020b). Ecosystem goods and services for health: Land degradation and desertification. <https://www.who.int/globalchange/ecosystems/desert/en/>
- Wright, L. D., D'Elia C. F., & Nichols C. R. (2019). Impacts of coastal waters and flooding on human health. In L. D. Wright & C. R. Nichols (Eds.), *Tomorrow's Coasts: Complex and Impermanent* (pp. 151–166). Springer.
- Yadav, R., Somashekar, D., Sodha, S. V., Laserson, K. F., Venkatesh, S., & Chauhan, H. (2019). Post-flood rapid needs assessment in Srinagar City, Jammu and Kashmir State, India, September, 2014. *Disaster Medicine and Public Health Preparedness*, 13(2), 133–137. <https://doi.org/10.1017/dmp.2018.21>
- Ziegler, C., Morelli, V., & Fawibe, O. (2017). Climate change and underserved communities. *Primary Care: Clinics in Office Practice*, 44(1), 171–184. <https://doi.org/10.1016/j.pop.2016.09.017>
- Kornburger, C., Gibson, C., Sadowski, S., Maletta, K., & Klingbeil, C. (2013). Using “teach-back” to promote a safe transition from hospital to home: An evidence-based approach to improving the discharge process. *Journal of Pediatric Nursing*, 28(3), 282–291. <https://doi.org/10.1016/j.pedn.2012.10.007>

Authors

Authored by

Monica Escalante Kolbuk, MSN, RN, CEN

Leah Hilderbrand, BSN, RN

Gordon L. Gillespie, PhD, DNP, RN, CEN, CNE, CPEN, PHCNS-BC, FAEN, FAAN

Reviewed by

2020 ENA Position Statement Committee Members

Elizabeth Stone, PhD, RN, CPEN, CHSE, FAEN, Chairperson

Andrew Bowman, MSN, RN, APRN, NP, ACNP-BC, EMT-P, CEN, CPEN, CFRN, CTRN, FAEN, ACNPC, CCRN, CCRN-CMC, CVRN, NREMT-P, NRP, TCRN

Brenda Braun, MSN, RN, CEN, CPEN, FAEN

Carla Brim, MN, RN, CNS, CEN, PHCNS-BC

Alison Day, PhD, MSN, BS, RN, FAEN

AnnMarie R. Papa, DNP, RN, CEN, NE-BC, FAEN, FAAN

Matthew Edward Proud, DNP, RN, CEN



Position Statement

930 E. Woodfield Road, Schaumburg, IL 60173 | 800.900.9659 | ena.org

Cheryl Lynn Riwitis, MSN, RN, FNP, EMT-B, CEN, CFRN, FNP-BC, TCRN, FAEN
Kathryn Starr Rogers, DNP, MSN, RN, CEN, CPEN, CPHQ, NEA-BC, TCRN
Diane M. Salentiny-Wroblewski, PhD, MS, RN, CEN, ACNS-BC, RN-BC
Jennifer Schieferle Uhlenbrock, DNP, MBA, RN, TCRN

2020 ENA Board of Directors Liaison

Gordon Gillespie, PhD, DNP, RN, CEN, CNE, CPEN, PHCNS-BC, FAEN, FAAN

2020 ENA Staff Liaison

Monica Escalante Kolbuk, MSN, RN, CEN

Developed: 2020.

Approved by the ENA Board of Directors: December 2020.

© Emergency Nurses Association 2020

This position statement, including the information and recommendations set forth herein, reflects ENA's current position with respect to the subject matter discussed herein based on current knowledge at the time of publication. This position statement is only current as of its publication date and is subject to change without notice as new information and advances emerge. The positions, information and recommendations discussed herein are not codified into law or regulations. In addition, variations in practice, which take into account the needs of the individual patient and the resources and limitations unique to the institution, may warrant approaches, treatments and/or procedures that differ from the recommendations outlined in this position statement. Therefore, this position statement should not be construed as dictating an exclusive course of management, treatment or care, nor does adherence to this position statement guarantee a particular outcome. ENA's position statements are never intended to replace a practitioner's best nursing judgment based on the clinical circumstances of a particular patient or patient population. Position statements are published by ENA for educational and informational purposes only, and ENA does not "approve" or "endorse" any specific sources of information referenced herein. ENA assumes no liability for any injury and/or damage to persons or property arising out of or related to the use of or reliance on any position statement.