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Title	The not so hidden effects of climate change related heatwaves on the cardiovascular system
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Publication date	2023-10-25
Original Citation	Lee, G. and Hendriks, J. (2023) 'The not so hidden effects of climate change related heatwaves on the cardiovascular system', International Emergency Nursing, 71, 101374 (2pp). doi: 10.1016/j.ienj.2023.101374
Type of publication	Article (peer-reviewed)
Link to publisher's version	10.1016/j.ienj.2023.101374
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Download date	2026-11-06 21:02:44
Item downloaded from	https://hdl.handle.net/10468/15257



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Editorial

The not so hidden effects of climate change related heatwaves on the cardiovascular system

Over the past year, we have witnessed catastrophic events relating to climate change across the globe including heatwaves, drought, floods and cyclones. The World Health Organization estimates that 24% of all deaths globally can be attributed to environmental causes [1]. The year 2022 saw the highest rates of deaths from the heat in Italy, Greece, Spain and Portugal (60,000 deaths) and this summer in the Northern Hemisphere, July was the hottest month ever recorded with unprecedented heatwaves [2]. In 2023, in Europe and Japan, sustained daily temperatures above 40^0C have been recorded and Sicily reached 47^0C while Arizona in the U.S. recorded 31 days consecutively above 43^0C [2-4]. Usually summer is associated with warmer weather, sunshine and holidays but these above normal temperatures have highlighted the fatal consequences in those with established cardiovascular disease (CVD) as well as in those previously seen as 'fit and healthy.' Some of the deaths were in those over 40 years, working outdoors in high temperatures and deaths of older people were reported in their homes where the temperatures were raised with poor/no air-conditioning and in one case, one fatality recorded hyperthermia with a body temperature of 42^0C [3].

Ambient temperature increases have direct physiological effects on the cardiovascular system including increased heart rate, increased blood viscosity, vasodilation, reduced cerebral perfusion and insensible fluid loss /sweating as the body tries to maintain a core temperature of 36.8^0C and heart failure can result, even in those with no cardiac history [4]. This is often compounded by dehydration leading to fluid and electrolyte imbalance and arrythmias resulting in collapse and the need for emergency care. One systematic review reported significant mortality and morbidity associations with heatwaves for the elderly and those with ischemic heart disease, stroke, heart failure, and chronic obstructive pulmonary disease [5].

Without regular breaks, shaded areas and access to drinking water (especially in those who work outdoors in farming, construction, etc), it is likely that we will witness more deaths from these heatwaves as they become more frequent. In terms of cardiovascular health, for each 1°C increase in temperature, there is an association with a 6% increase in cardiovascular disease [6]. Higher mortality is evident on older people, especially those over 65 years so one important question is whether we need to start primary prevention in terms of educating and advising people about managing in adverse temperatures, especially those with established cardiovascular conditions.

From an emergency care perspective, we can assess and treat the direct effects of heat on the body as part of the initial assessment. Critically, emergency nurses are in a position to advise and educate people about the risks of heat stroke and heat exhaustion, and this would not be limited to those people with a cardiovascular condition, but also healthy people. This should also include education and warnings about the danger of sunbathing (especially in combination with the use of alcohol). However, there is a paucity of guidance on how we communicate the risks of cardiovascular disease to our patients despite being well placed to do so. It is evident that those with pre-existing cardiovascular conditions and older people are at increased risk of heat-related mortality and morbidity and yet, no evidence-based guidelines have been developed. From a policy aspect, nurses and allied professionals can act as advocates for public health especially in relation to COP28 (the United Nations Climate Change Conference, known as Conference of the Parties, COP28) to be held in late 2023 and reducing the effects of climate change, especially in low to middle income countries that are extremely vulnerable to the impacts of climate change [7,8]. Education on heat and increased temperatures could be integrated into professional education as well as integrated into models of care. One paper outlined the need for emergency department preparedness but it is not possible to determine if changes have taken place in practice [9].

The American Heart Association (AHA) has developed simple hot weather advice for the public with their 'Protect your heart in the heat' [10]:

- Stay indoors from noon to 3 p.m. when the sun is at its strongest and the risk of heat-related problems is higher
- Wear lightweight, light-coloured clothing in breathable fabrics, a sun hat, glasses and use sunscreen
- Stay hydrated as dehydration causes the heart to work harder, avoid caffeine and alcohol
- Take regular breaks, rest, and rehydrate
- Continue to take all medications as prescribed

The AHA webpage also provides a list of symptoms of heat exhaustion and heatstroke. It would also be useful to ensure that all emergency clinicians are aware of these signs and symptoms as heat-related presentation are likely to continue to increase. In the United Kingdom in early September with 7 days above 30^{o}C, there was a 522% increase in people seeking advice about heat exhaustion and there is now a list of tips in how to avoid heat exhaustion on the NHS website.

None of us are immune from the changes to our climate and with expected record levels of hot weather in the next five years, we urgently need to develop and implement guidelines to manage

heat-related presentations, especially in those with pre-existing CVD. Hot weather is dangerous and can be fatal. Simple messaging is a good start and could easily be developed within pre-hospital care and emergency departments namely; stay hydrated, wear appropriate clothes and avoid excessive physical activity. We also need to be aware of assessing patients for these symptoms whilst undertaking triage or assessing patients in the emergency department. This is especially relevant in those vulnerable to heat-related health issues including those who have pre-existing CVD, older people and those working outdoors are aware of their increased risk. Heatwaves are dangerous for everyone's health and we need to increase the public's awareness of the dangers of heatwaves that are a result of climate change- heat can kill.

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