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Heat Waves: a climate change challenge to hospitals' resilience

The scientifically based forecast of more frequent devastating natural disasters is coming, and so is the need for a proactive attitude against the related risks. Hospitals and healthcare systems should get engaged in such activity.



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Scientific evidence of the relation between natural disasters and climate change

It is becoming a constant in our daily life the call for attention from the media to climate-related natural disasters. Until recent years, important institutions such as the Intergovernmental Panel on Climate Change (IPCC) were encountering scepticism when they, as early as in 2001, were underlining that “there is new and stronger evidence that most of the warming observed over the last 50 years is attributable to human activities” (IPCC Climate Change 2001). The main argument against this conclusion was the lack of scientific evidence of the relation between anthropogenic activities and global warming, the main cause of climate change.

The European Parliament's Environment, Public Health and Food Safety Committee requested a study representing the uncertainty, or the diplomatic prudence, of that period among policymakers. The study was titled “Climate Change and Natural Disasters: Scientific evidence of a possible relation between recent natural disasters and climate change.” The conclusion was: “with or without climate change, physical damage from extreme weather is increasing in Europe with climate change having made certain extreme events more likely and the likelihood that it will be even worse in the future, it is prudent an adequate response” (Anderson and Bausch 2006).

The scientific evidence of the cause and effect relationship between climate change and natural disasters is now irrefutable. It has become, in fact, the basis of relevant public initiatives such as the Conference of Parties (COPs). Specifically, the 21st COP, held in December 2015 in Paris, concluded with the important “Agreement on Climate Change Mitigation.” Actions and scientific studies followed. In 2017 the European

Environment Agency gave evidence to a new policy approach with the publication on “Climate Change adaptation and disasters risk reduction in Europe” (EEA 2017). International scientists have formed important organisations, such as the World Weather Attribution (worldweatherattribution.com), working since 2015, and focusing on “research and develop scientific tools and methodologies to perform timely and robust assessments of whether and to what extent human-induced climate change played a role in the magnitude and frequency of extreme weather events.”

The growing evidence coming from the scientific society of climate change as mostly produced by anthropogenic behaviour has still to face some doubt or even the implicit denial. The United States, relevant nation, has recently declared to cease all participation in the initiatives foreseen by the above mentioned Paris agreement.

The scientifically based forecast of more frequent devastating natural disasters is coming, and so is the need for a proactive attitude against the related risks. Hospitals and healthcare systems should get engaged in such activity. Climate change is, in fact, responsible for major health problems.

The area and focus of the article

Climate change has produced and is producing two types of different impacts: the “long-term” and “immediate” disasters.

Without disregarding the need of our awareness and concern for the destruction of the Australian coastal reef, the progressive desertification of North-East Africa, the icebergs melting and glaciers shrinking, we will focus on the geographic framework of Europe and the risks associated with it.

Healthcare systems should mostly be concerned with immediate impact. These were identified in the article

“Increasing risk over time of weather-related hazards to the European population” (Forzieri et al. 2017) as:

- Extreme heat waves
- Cold waves
- Increased precipitation and flooding
- Storms and high winds
- Related events such as landslides and fires

We aim to focus on the extreme heat waves, because of their relevance in giving evidence to the new needs of social and health care and consequently of appropriate consciousness in a hospital’s management and staff, medical or otherwise, planner and designer of health facilities about:

- The importance of health systems collaboration with policymakers for impact reduction in the new reality of climate change-related risk of natural disasters
- The community value of healthcare infrastructure resilience, as part of a strategic system
- The potential of hospitals in enhancing public understanding and community preparedness

“ THE SCIENTIFIC EVIDENCE OF THE CAUSE AND EFFECT RELATIONSHIP BETWEEN CLIMATE CHANGE AND NATURAL DISASTERS IS NOW IRREFUTABLE ”

Scientific studies and climate modelling have indicated that the measures to counteract climate change could not have, in the best of the circumstances, a relevant short-term impact; consequently, we are very likely to experience in the near and medium future an increase in extreme weather events. Also, the sceptics that human causes have given the greatest contribution to the rising of temperatures are admitting that the disastrous natural events will keep increasing in number and also in severity.

The concern among the public policymakers is becoming more evident, and new strategies suggested, envisaging the need for more systemic approaches and visions that start in finding the most efficient measures for adaptation to climate change and natural disaster reduction.

Heatwaves: a nasty enemy

Heatwaves are difficult to define and classify. In fact, in addition to magnitude, how rapidly they hit, and duration, there are multiple local conditions and factors influencing their perception and impact. This makes

it difficult to compare different reports and studies.

For our article, we will refer to the definition proposed in the report “The social impacts of heat waves” issued by the public “Environment Agency” dealing with the protection of the environment in England and Wales, which considers heat waves as periods of “anomalous heat that generate a societal response” (McGregor et al. 2007).

This definition is relevant for our work, posing the accent on the effects on society, which are the ones that can or will determine the pressure on hospitals, with the increased need for care.

The heat wave of 2003 that involved a large part of Europe, with its dramatic effects had stimulated some attention to this natural risk. However, to date, heat as a social hazard connected to climate change is still not sufficiently understood and studied. Some of the possible reasons lay on social factors. The few studies available, give evidence to the fact that outcomes of mortality and morbidity, infrastructures failures and even criminality as a consequence of heat waves, are marked by a heavy social component, ie they are much higher in the poorest areas of cities, where in fact, the impact of heat waves are more extreme and longer lasting. An article of January 18, 2018, in an Australian web-paper, reported the social un-preparedness on coping with heat waves in spite of being Australia’s deadliest natural hazard (Gissing and Coates 2018).

This could happen in Europe, where the heat waves and parallel drought facilitate bush and forest fires. In England, the major heat waves coincided with diffused drought, and they all had in common high ozone level, the combined effects of which are reported potentially lethal. The most advanced climate model has been predicting increases in heat waves frequency, intensity, and longer duration.

The new report of IPCC that is starting to be made public keeps very high the guard against the natural hazard, including heat waves, also in their relation with drought and wildfires.

World Weather Attribution has published at the end of July 2018 a detailed study on “the heat waves in Northern Europe,” confirming that all Europe has been kept under the potential risks of natural disasters, with an increased number and duration of heat waves.

Vulnerability to heat

As underlined before, the vulnerability to heat for a human being is a component of many factors, depending on:

- level and the duration of the exposure to the hazard

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- age, health conditions of the person
- home situation
- environment characteristics and conditions

An interesting comparison comes from the study dedicated to the social impact of heat waves.

Summary of health-related threshold temperatures and mortality rates above threshold (McGregor et al.)

Among studies dealing with the vulnerability of persons, evidence-based in qualitative terms, the organisation Physicians for Social Responsibility (PSR 2018) indicate the following levels in the difference of susceptibility:

- The elderly who suffer from poor health
- The elderly in general because of diminished ability to regulate body temperature
- Babies and young children
- Pregnant and nursing mothers
- Those chronically ill with pre-existing cardiovascular, respiratory, neurologic, and psychiatric conditions, or obesity.
- Outdoor workers
- People who abuse drugs and alcohol
- People without access to air conditioning
- Urban populations as city environments generally have temperatures some degrees warmer than country areas. More frequently in urban areas, there are situations of poor housing, connected very poor economic situations

After the devastating effects in many parts of Europe of the 2003 and 2005 hot waves, more studies were developed focused especially in giving scientific evidence to the connections between natural disasters and health.

In the part dedicated to heat waves of “Global and planetary change,” the authors underline that the impact on health increases when extreme daytime temperatures combine with warm night-time temperatures, high humidity and light warm winds for several consecutive days. They define two types of impact on human health related to strong and extreme events according to specified thresholds of thermal stress and duration (Amengual et al. 2014). This has specific importance for hospitals preparedness for those events. In this regard, it needs to be stressed that the lack of sufficient and comparable studies leaves several aspects still unclear, important especially for hospitals preparation and awareness.

It also needs to be acknowledged, as said before, that the impact on mortality, morbidity, community disruption depends from the social situation (eg age structure), epidemiologic situation (eg general situation

of the community health) geographic, environmental, urban conditions. The advancing of the knowledge also put in the picture the difference between this natural disaster and others, such as floods, the impact of which is evident almost immediately.

Heat waves can produce effects that come out slowly and/or could be incremented by other factors in subsequent times. From the studies available, heat waves can be divided into those that have a:

Direct impact on health

- **Immediate**, that is requiring direct hospitalisation and/or emergency home services
- **Time delayed**, needs for hospitalisation or other forms of help and assistance grow and become necessary in a progressive way
- **Demanding more studies and evaluations**, which is the case for the effects on mentally ill persons or for types of violent behaviour

Direct impact on healthcare infrastructures

- **Electricity systems** that could fail under high demand inside the hospital or in the community
- **Other systems** such as water, medicines, space for services,
- **Emergency vehicles** and staff requested for the services inside and outside the hospital

It is also necessary to consider the possibility of other events which, as mentioned, are happening as a consequence of the heat wave, such as fires and the sufficient critical conditions of temperature and humidity following the heat wave.

The health problems that could be more likely related to heat wave include:

- Cardiovascular problems,
- Respiratory problems
- Heat strokes, with the rise of temperature, delirium, convulsions, and coma that can result in death
- Milder effects such as rashes, cramps, heat exhaustion

Among the long-lasting effects of stress exacerbated by heat there could be:

- Increase in symptoms of mental illness
- Increase in violent behaviour
- Higher risk of suicide and homicide

The side events that could develop and have developed in some instances are the explosion of fires, with consequences that could go from many victims and destruction of the environment and build urban areas, to minor destructions, but intoxications and problems with animals.

Hospital as a strategic institution

The set of issues that we have only partially highlighted poses serious questions to people working in hospital structures, in all capacity, but especially the managers and technical staff who are involved in keeping the functionality of their structures, responding to the needs of their communities and performing the necessary services.

- Functionality Preparedness

This is the first step for preventive management. Disasters' managers say: the moment that the disastrous event happens, it is too late to get ready. Acting with the community and all the staff, in the framework of the general Strategic Plan of Prevention and Mitigation of the Community, and other superior territorial levels of Government, the crucial elements of prevention have to be put in place, according to the major disasters that the community could be suffering. The necessary preparation has to be programmed and realised immediately after general consensus and roles agreement.

The hospital can and should be one of the points of diffusion of information toward the community, through its staff, the patients and their families and specific diffusion events.

The internal preparedness should focus on:

- Managing massive presence of people at the hospital, some for treatments, others for searching for relatives or simply for general information. A list of available psychologists should be made. Among the studies produced, it is worth mentioning the European project IPPHEC (Improving Preparedness to give Psychological help in Hospital in case of massive emergency Crises). This international study, directed by the Italian Ministry of Health, produced guidelines, addressed to cases of terrorism, but certainly should also be considered for natural disasters (EAHC 2010).
- Control of technical systems, first of all of the electrical, water, waste disposal, the supply of essential medicine and food.
- There are no tools prepared, up to now, with regard to resilience, providing measures as for other aspects (eg fire or seismic norms for prevention in new hospitals constructions)

One of the aspects needing in-depth studies is "redundancy," ie the evaluation of which are persons, medicines, equipment and services that are absolutely necessary to have the possibility of alternative sources of supply for guaranteeing the continuity of the hospital activity. Getting to the specific of heat waves, the first consideration to make is:

- If there is a potential risk of fire related to its area of catchment and the structure has been selected, for example, to be the reference in case of persons severely burned, the hospital will have to prepare ad hoc specific structures.
- To prepare adequate plants is crucial for energy supply. It has happened in several instances, that the hospital did not have access to energy for several days, without even the possibility of receiving fuel for producing its own energy. The updating of storages based on different energy production is essential, possibly eliminating diesel motors for such use.
- The other essential resource, water, also has to be a priority in case of a heat wave, also for medical needs, de-hydration being one of the possible major problems

What lies ahead

The social aspects deriving from heat waves impact are important. We have stressed how poor people are more likely to suffer from heat waves, not to speak of the marginalised part of society. The technical dimensions are also of relevance, since health facilities, first of all, hospitals, are and will remain strategic pillars in support of the social fabric for adaptation and mitigation.

It is, therefore, necessary that we prepare staff as well as health facilities about all aspects: medical, social and technical, against extreme risks of natural disasters, and start addressing the one risk that has not received sufficient attention: heat waves. A follow-up analysis will be dedicated to highlight the technical factors that need to be tackled in order to have hospital prepared for heat extremes, in the certainty that preparedness against heat waves risks, will assure to the hospitals the capacity to cope also for other climate change related potential disasters. ■

KEY POINTS



- ✓ There is a scientifically-proven link between natural disasters and climate change
- ✓ Heatwaves are a growing threat to vulnerable populations
- ✓ The hospital can operate as a strategic institution to mitigate impact of extreme



REFERENCES

For full references, please email edito@healthmanagement.org or visit <https://iii.hm/r17>