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EDITORIAL

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The 2003 European heat wave

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Heat is well-known as a killer in diverse parts of the world, including Europe. It has struck France (1976), Greece (1987), Belgium (1994) and Wales and England (1995), causing the death of hundreds of people [1, 2, 3, 4, 5]. The summer heat wave of 2003 was exceptional for the extensive loss of life, which culminated in 14,800 deaths in France during the 9 days of extreme temperatures [5]. Heavy casualties occurred in other European countries, namely Italy, Spain, Portugal and the United Kingdom, where the as yet unconfirmed figures for fatalities are between 1,000 and 5,000 people.

The death-toll observed in France has no equivalent in contemporary history. It represents more than 20 times the excess deaths reported during the 1995 Chicago heat wave, which is often cited for comparison [6]. It even surpasses two-fold the death-toll observed in USA over the past 20 years [7]. A similitude to the French figure can only be traced to previous centuries, namely the Beijing heat wave in 1743, which resulted in 11,000 deaths [8]. This summer's extraordinary death-toll confounded the French health-care system, considered as one of the best in the world, and cast doubt on the social cohesion. Following this stupefying impact, several important questions are being raised. How could it be that, in the 21st century, an illness would kill 14,800 people in less than 10 days in one of the more highly developed countries in the world? What lessons can be learned from this tragedy? How can it be prevented in the future?

Two preliminary reports on the recent heat wave have been published to date and these are accessible online: one by the French watchdog, the *Institut National de Veille Sanitaire* (INVS) and the other by the *Institut National de la Santé et de la Recherche Médicale* (INSERM) [4, 5]. These accounts shed light on the sequence of events and unveil the demographic characteristics of the victims. The heat wave began in early August and was characterised by a progressive increase in the ambient temperature from 25°C to reach 37°C on the 4th August, at which level it remained until the 13th when it started decreasing. This pattern of a temperature greater than 37°C being maintained for nine consecutive days had not been observed in France since 1873. The number of heat-related deaths increased dramatically in an exponential fashion as never described before: 300 by August 4th, 3,900 by August 8th, 10,600 by August 12th and 14,800 by August 20th. The excess deaths occurred in hospital (42%), home (35%) and "*maisons de retraite*" (19%). The epidemiologists of both the aforementioned institutes have speculated that this brusque acceleration in the number of casualties was a consequence of a cumulative effect of the exceptional intensity and the prolonged duration of the heat. Other speculations have been that elevation of the minimum temperature above 25.5°C did not allow recovery from the severe heat-stress experienced during the day and, finally, that an extremely high level of ozone may have been contributory. A thorough evaluation of these phenomena will probably continue during several months to come. The results of this analysis will be awaited eagerly, because they will be crucial to the formulation of a strategy to prevent a similar tragedy striking Europe in the future.

Most of the deaths were attributed to heat and, although those affected were essentially the elderly (70% and 120% excess deaths in the age groups 75–94 and more than 95 years old, respectively), there was also an unusually high number of heat-related deaths among the younger and still vigorous population (20% and 40% ex-

cess deaths in the age groups 45–54 and 55–74 years old, respectively). Whether the 45–54 years old group, for example, had any particular predisposing risk factors merits further case-controlled study.

Additional information from the two French reports suggests that risk factors known to increase susceptibility to heat illness were also in play. These were the social isolation of elderly persons with co-morbid conditions such as psychiatric, pulmonary or cardiovascular illnesses, the use of medications that interfere with thermoregulation and the absence of air-conditioning.

Lessons from previous European heat waves were forgotten with the first rain and chill of autumn, perhaps because of the sentiment that these were once-in-a-lifetime occurrences. Unfortunately, the recent heat wave is, indeed, different because of the magnitude of the loss of human life, which has yet to be completely assessed. Many of those who survived heatstroke are anticipated to sustain severe neurological damage, which may culminate in death even up to 1 year or more after the illness. For example, following the heat wave in Chicago in 1995, a third of those who survived heatstroke had severe neurological damage that resulted in death at 1 year in up to 29% [9]. The socio-economic outcome of the heat epidemic in France has not yet been completely assessed, but it will surely be considerable. Again, in Chicago there were 3,000 excess consultations to the emergency medical services (EMS), in addition to the 700 excess deaths. In Mecca, when the pilgrimage is held in the summer, a similar ratio of approximately one case of heatstroke for five to seven of heat exhaustion and/or other more benign heat-illness requiring treatment in EMS is regularly noted [10].

Sophisticated predictive data based on observation and modelling forecast extreme climatic changes consequent to the phenomenon of global warming [11]. Frequent and severe heat waves, cold waves, drought and flooding are to be expected in the 21st century, even in temperate regions. Without debating whether this forecast is accurate or that global warming is the real culprit behind these meteorological events, the unacceptable death toll should induce serious reflection, and lead to a European plan based on durable solutions for the protection of the population, particularly the vulnerable, from future natural calamities such as heat waves.

Since the only known protective measure against heat is to withdraw from it, the long-lasting solution is the widespread installation of air-conditioning in hospitals, nursing and retirement homes, and other public buildings [12, 13]. It is even more important to facilitate the access, for those at risk, to air-conditioned places or shelters that could be readily deployed during a heat wave. Spending a few hours each day in an air-conditioned environment is protective [12, 13]. Therefore reducing energy costs during extreme heat waves to make air-conditioning affordable for lower income groups may be another effective pre-emptive step. Others measures that should be considered are early warning systems for severe weather, advance reports in news media, broadcasting simple advice (drink plenty of water or non-alcoholic beverages, avoid unnecessary exertion, take showers regularly), as well as mobilisation within the community to seek out the most vulnerable and ensure their protection. Such measures have already been shown to reduce markedly the morbidity and mortality during heat waves in USA [6, 7].

From the physicians' perspective, particularly in France, the dominant feelings during and after this summer heat wave were surprise and dismay. Health-care personnel were confronted with severe heat-related illnesses, which they were neither familiar with nor trained to treat, namely heat exhaustion and life-threatening heatstroke. Perhaps one of the lessons to be learned is that physicians should think "globalisation" for patient care. There are no longer frontiers or latitudes for disease and everyone should relearn the pathologies of "others", even the exotic ones, whether he or she is practising in Lagos, Paris, Tokyo or New York.

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