

Municipal Heat Wave Response Plans

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Approximately 400 people die from extreme heat each year in the United States, and the risk of heat waves may increase as a result of global climate change. Despite the risk of heat-related morbidity and mortality, many cities lack written heat response plans. In a review of plans from 18 cities at risk for heat-related mortality, we found that many cities had inadequate or no heat response plans. This is an important area for further investigation and government attention. (*Am J Public Health*. 2004;94:1520–1522)

Heat-related mortality has historically been an important, yet underestimated, public health problem in the United States.^{1–23} Since 1998, heat waves have resulted in more weather-related fatalities annually than any other natural disaster (about 400 deaths per year).²⁴ Heat wave effects may increase in the near future as a result of global climate change.^{3,25–31}

People most at risk include elderly and very young persons, chronically ill patients, socially isolated people, urban residents, and people without access to air conditioning.^{2,9,12,19,23,32–38} The public health effect of heat waves is associated with factors such as the intensity, duration, time of year, and ex-

tent to which the heat event deviates from the norm experienced by the population.^{2,39–48}

As with other disasters, municipalities must be prepared for heat waves.^{2,21,49} However, many at-risk cities have minimal or no heat wave response plans. In the summer of 2002, we reviewed response plans from 18 cities with a history of, or at risk for, heat-related mortality. Our goal was to determine whether these plans reflected awareness of the risk, risk factors, and response measures. What we found suggests that this is an important area for future investigation and government attention.

One third of the cities we contacted lacked any written heat planning (including heat-specific measures incorporated into all-hazards plans). Although 10 cities did have stand-alone heat response plans, almost one third of these were cursory.

Heat wave planning should be organized around a few central principles: (1) identification of a lead agency and participating organizations; (2) use of a consistent, standardized warning system activated and deactivated according to weather conditions; (3) use of communication and public education; (4) implementation of response activities targeting high-risk populations; (5) collection and evaluation of information; and (6) revision of the plan.^{5,49} Effective planning may have played a role in reducing heat-related mortality during recent heat waves.^{38,50,51}

Comprehensive heat response requires involvement of many city departments and nongovernmental organizations. In most of the reviewed plans, heat response was coordinated by public safety or emergency management offices, but a few were based in the health department. Some plans identified other participating organizations.

Response measures should be implemented as appropriate on the basis of local data showing weather thresholds associated with increased mortality.^{31,52} Plans we reviewed initiated response on the basis of criteria, including threshold temperature; heat index, which incorporates heat and humidity; and a synoptic air mass method.^{53–60} Regardless of the method used to identify a threshold weather event for response, heatstroke has a fast onset and poor survival rate,⁶¹ so prevention efforts must begin when high tempera-

tures are forecast rather than when they arrive.^{16,21} A few plans took a phased approach to response, which is valuable because mortality increases nonlinearly with the duration of the heat event.^{2,8,14,39,60,62}

Plans also should be clear regarding when deactivation is appropriate. During the 1999 Midwest heat wave, a brief break in the heat triggered a declaration in Chicago, Ill, that the emergency was over, while in St. Louis, Mo, heat response remained effective because of conservative deactivation criteria; this early declaration may have led to additional deaths in Chicago.⁶²

In general, the plans detailed public information procedures. However, most provided for public outreach only when a heat wave was imminent or had already begun.

Because access to air conditioning is the most effective intervention to reduce mortality from heat waves,^{2,34} many cities took steps to increase such access by opening buildings to the public. Unfortunately, centralized cooling centers have not proved effective in reaching the most at-risk seniors.^{38,62}

Targeted outreach is critical to reaching the socially isolated.^{1,50,63} Two cities collected voluntarily submitted names of at-risk individuals to be contacted during a heat emergency, but it was unclear how well this service operated. Four cities asked neighborhood organizations or mail or utility workers to check on at-risk individuals. Several cities publicly urged people to check in with elderly individuals; the usefulness of this advice is unclear.³⁸ Although people with mental or chronic illness form a significant proportion of the victims of recent heat waves,^{38,64} only 1 plan emphasized reaching out to disabled persons. Only 2 plans addressed the shelter and water needs of the homeless.⁵²

Five of the cities reported fan distribution programs, despite evidence that fans do not reduce mortality risk during heat waves and can increase heat stress if used improperly.^{2,14,36,38,65} In 3 cities, residential water service cannot be shut off during extreme heat events, and several cities took steps to prevent illegal use of fire hydrants.

Surveillance on weather, hospital and ambulance use, medical examiner reports,^{23,35} electric and water supply and demand, and outreach efforts—critical to determining the

effectiveness of interventions—was absent or minimal under most plans reviewed.

Comprehensive response plans are necessary to reduce heat-related morbidity and mortality. Plans should provide for coordinated action across government authorities, involve private sector participants, and be responsive to variable risk factors. More research is needed on plan effectiveness. ■

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This brief was accepted April 27, 2004.

Contributors

S.M. Bernard conducted the investigation and was primarily responsible for the analysis and writing of the brief. M.A. McGeehin identified the need for such an investigation and assisted with the analysis and background.

Acknowledgments

Susan M. Bernard's work on this brief was funded in part by US Environmental Protection Agency Office of Research and Development cooperative agreement CR 827040 and in part through an Intergovernmental Personnel Agreement between the Centers for Disease Control and Prevention and the Johns Hopkins Bloomberg School of Public Health.

Human Participant Protection

No protocol approval was needed for this study.

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