

The heat is on: Causes of hospitalization due to heat waves identified

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In the largest and most comprehensive study of heat-related illness to date, Harvard School of Public Health (HSPH) researchers have identified a handful of potentially serious disorders—including fluid and electrolyte disorders, renal failure, urinary tract infections, sepsis, and heat stroke—that put older Americans at significantly increased risk of winding up in the hospital during periods of extreme heat.

The study also showed that risks were larger when the [heat](#) wave periods were longer and more extreme and were largest on the heat wave day, but remained elevated for up to five subsequent days.

"An innovative aspect of this work is that, rather than preselect a few individual diseases to examine, we considered all possible causes of hospital admission during heat waves in order to characterize the effects of heat on multiple organ systems," said Francesca Dominici, professor of biostatistics at HSPH and senior author of the study.

The study appears online December 23, 2014 in the *Journal of the American Medical Association (JAMA)*.

Although it's well-known that heat waves pose a health risk to older people, previous studies had investigated only a small number of potential heat-related health outcomes, such as cardiovascular and respiratory diseases.

For this study, the researchers analyzed 127 billion daily hospitalization

rates from 214 diseases in a population of 23.7 million Medicare beneficiaries between 1999 and 2010, in 1,943 counties across the U.S., and paired that information with data from more than 4,000 temperature monitors around the country.

Heat stroke posed the greatest risk; older Americans were two-and-a-half times more likely to be hospitalized from [heat stroke](#) during heat waves than on non-heat-wave days. Extreme heat also put the elderly at 18% greater risk of being hospitalized for fluid and electrolyte disorders; 14% greater risk for [renal failure](#); 10% greater risk for [urinary tract infections](#); and 6% greater risk for sepsis (severe blood infection).

The findings are significant because extreme heat is the most common cause of weather-related mortality in the U.S., and because, as climate change progresses, the health impacts are expected to be profound. For example, the National Resources Defense Council recently reported that, under climate change, [extreme heat](#) events could lead to more than 150,000 deaths in the 40 largest U.S. cities by the end of the century.

"Knowledge of which diseases are most likely to occur during [heat waves](#) could help health systems to be better prepared to prevent and treat excess heat-related hospitalizations now and as [climate change](#) progresses," said Jennifer Bobb, research associate in the Department of Biostatistics at HSPH and lead author of the study.

More information: "Cause-specific risk of hospital admission related to extreme heat in older adults," Jennifer F. Bobb, Ziad Obermeyer, Yun Wang, Francesca Dominici, *Journal of the American Medical Association*, online December 23, 2014, [DOI: 10.1001/jama.2014.15715](https://doi.org/10.1001/jama.2014.15715)

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