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Heat-Related Deaths -- Philadelphia and United States, 1993-1994

During June 1994, temperatures across the United States were higher than usual. Since June 13, record high temperatures (above 90 F {32.2 C}) with humidities of 50%-60% have occurred in the northeastern United States (1). During July 1-14, 1993, the eastern United States also experienced a severe heat wave with high temperatures (93 F-101 F {33.9 C-38.3 C}) and high humidity (36%- 58%) (2). During July 6-14, 1993, in Philadelphia, medical examiners (MEs) determined 118 deaths were heat-related*. This report describes heat-related deaths that occurred in Philadelphia during 1993 and 1994 and summarizes risk factors for heat-related illness and death. Case 1. On June 16, 1994, a 33-year-old man who had collapsed on a street was found by emergency personnel and taken to an emergency department; he was dead on arrival. His core body temperature was 108 F (42.2 C). Although the primary (i.e., immediate or underlying) cause of death was an adverse reaction to cocaine, hyperthermia was listed as a contributing factor. Case 2. On July 12, 1993, a 61-year-old man was found dead in his residence, which was hot and unventilated; his rectal temperature was 105 F (40.6 C). He had Parkinson disease; methamphetamines and amphetamines, metabolic products of medication for the disease, were detected on autopsy. The ME listed the primary cause of death as hyperthermia, with Parkinson disease listed as a contributing factor. Case 3. On July 11, 1993, a 70-year-old woman was found dead in her home. The home contained no air conditioner; a fan was off, and the windows were closed. The room temperature was estimated by the ME investigators as 130 F (54.4 C). Cardiovascular disease was listed as the primary cause of death, with hyperthermia a contributing factor. The outdoor maximum temperature and relative humidity on that day were 96 F (35.6 C) and 40%, respectively.

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Editorial Note

Editorial Note: Mortality from all causes increases during heat waves, and excessive heat is an important contributing factor, particularly among the elderly (3). During 1979-1991, a total of 5224 deaths in the United States were attributed to excessive heat. ** During 1987-1988, 1092 death certificates listed excessive heat as either the primary or a contributing cause of death.

The 118 deaths associated with the 1993 heat wave in Philadelphia underscore the need to recognize risk factors for and institute strategies to prevent heat-related illness. MEs can

identify increases in deaths specifically attributed to excessive heat, and ME surveillance can be used for early identification of severe illness associated with heat waves (4). Because individual MEs and coroners use varying criteria to determine which deaths are attributable to heat-related illness, a standard definition is needed to accurately classify these deaths.

Persons at increased risk for heat-related illness include the very young (particularly infants), the elderly (i.e., persons aged greater than or equal to 65 years), persons who are physically active in hot environments and fail to rest frequently or to drink enough fluids, and those unable to obtain adequate fluids or avoid hot environments (5). However, any person is at risk for severe or fatal heat-related illness if sufficiently exposed. Heat can contribute to or exacerbate underlying illness as well as be the primary cause of illness or death. The use of certain drugs also may increase the risk for heat-related illness (5): for example, cocaine and neuroleptics (e.g., haloperidol or chlorpromazine) impair thermoregulatory function, and medications with anticholinergic effects (e.g., medication for Parkinson disease) inhibit perspiration (6). In addition, excessive alcohol consumption may cause dehydration and result in heat-related illness (5). The risk for heat-induced illness is greatest before persons become acclimatized to warm environments. Ten to 14 days of exposure to heat are usually needed for acclimatization (7).

The use of air conditioning reduces the risk for heatstroke and heat-related illness, even if it is available for only part of the day (5). Because air conditioning is a protective factor, poverty is a risk factor for heat-related illness. Increased air movement (e.g., with fans) is associated with increased heat stress when the ambient temperature exceeds approximately 100 F (37.8 C) (the exact temperature varies with the humidity {5}). Therefore, fans are not protective at temperatures higher than 90 F (32.2 C) with humidity greater than 35%. Persons without home air conditioners should be encouraged and assisted in taking advantage of air-conditioned environments in private or public places (e.g., shopping malls, public libraries, and heat-wave shelters). Cooling of the body also is possible by immersion in a tub of cool water (59 F-61 F {15.0 C-16.1 C}). Persons should drink plenty of fluids and exercise only during cooler parts of the day to reduce their risk for heat-related illness (5).

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* The MEs listed "hyperthermia" (core body temperature 105 F {40.6 C} or higher) as the cause of death or "heat-related" (primarily when a body was found in a hot, unventilated environment) as a contributing cause of death on the death certificate.

** Underlying cause of death attributed to excessive heat exposure, classified according to the International Classification of Diseases, Ninth Revision (ICD-9), as E900.0, "due to weather conditions" (2140 deaths); E900.1, "of man-made origin" (233 deaths); or E900.9, "of unspecified origin" (2851 deaths). These data were obtained from the Compressed Mortality File (CMF) of CDC's National Center for Health Statistics, which contains information from death certificates filed in the 50 states and the District of Columbia that have been prepared in accordance with external cause codes. CDC's Wide-ranging ONline Data for Epidemiologic Research computerized information system was used to access CMF data.

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