Exposure-Related Hypothermia Mortality in the United States, 1970–79

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Abstract: This study describes exposure-related hypothermia deaths in the United States from 1970 to 1979. Mortality risk from hypothermia increases with age; at all ages, non-White men are at highest risk and White women at lowest risk. Counts of deaths from hypothermia based on information from death certificate data may be understated. Effective social intervention to prevent hypothermia mortality and morbidity requires better public health surveillance and intensive case-finding. (*Am J Public Health* 1984; 74:1159–1160.)

Introduction

Accidental or exposure-related hypothermia is an unintentional drop of body temperature below 95°F (35°C).[1] The commonly reported victims of exposure-related hypothermia include the elderly, the newborn, individuals who are unconscious, immobile, or drugged, alcoholics, and healthy persons who are trapped in the cold. Mortality from cold exposure is related to the degree of hypothermia, the presence of an underlying medical disorder, and age.[2–6] Although there is agreement that prevention is more important than therapy,[7] the public policy measures to be taken are not identified in the medical literature.

Despite the recent attention paid to its clinical aspects, particularly among the elderly, the epidemiology of exposure-related hypothermia in the United States remains unknown. This report describes recent exposure-related hypothermia deaths in the United States and in selected population groups.

Methods

The frequency distribution of deaths due to exposure to excessive cold by age, color, and sex from 1970 to 1979 were obtained from unpublished mortality data collected by the National Center for Health Statistics (NCHS).[8,9] Except for 1972, the NCHS data shown in this paper are based on information from all death certificates from the 50 states and the District of Columbia. For 1972, data are from a 50 per cent sample of deaths. The mortality statistics shown in this paper refer to cause-of-death category E901, "excessive cold" which includes statements such as exhaustion from cold, exposure to cold, freezing, frostbite, frozen.*

The data from 1970 to 1978 are classified under the Eighth Revision of the International Classification of Disease while the data for 1979 are classified by the Ninth Revision. Population estimates of the United States from the Bureau of the Census were used to compute the rates shown in this paper. Average annual death rates were computed by dividing the sum of the 1970 to 1979 hypothermia deaths by the sum of the 1970 to 1979 population estimates.**

Results

Table 1 shows that 4,826 hypothermia deaths were reported in the 1970–79 period, of which 1,884 (39 per cent) were to individuals age 65 years and older. Table 1 also shows the average annual death rates for all ages (.227 per 100,000 population) and for specific age groups. A continuous increase in mortality risk is associated with increasing age. The annual crude death rate ranged from .164 in 1974 to .322 in 1979.

Table 2 reveals systematic differences in hypothermia mortality risk by age, color, and sex: the average annual death rates of the non-White population are higher than those of the White population, regardless of age and sex; men are at higher risk of dying from cold exposure than women, regardless of age and color; the group at highest risk are non-White men aged 75 years and older, while White women in the elderly age groups are at lowest risk.

Discussion

Reviewing the literature on the accuracy of statements of causes of death, Gittlesohn has described the major problems as resulting from "the current state of medical knowledge, incomplete information available at the time of death, the variable practice of physicians in completing the medical certification on the death record, . . . and changes in styles of labeling diagnoses."[10] These problems affect what we know about hypothermia mortality from death certificate data.

It is likely that some hypothermia deaths go unreported because some physicians and coroners are insufficiently aware of exposure to cold as a potential cause of death. But even when the physician of record is fully aware of this possibility, the omission of hypothermia from the death certificate may result from incomplete or erroneous information available at the time of death. If, for example, the body of the deceased is discovered hours after death, exposure to cold may not be identified as the underlying cause of death. Moreover, potential social embarrassment to the relatives of the deceased, or the landlord's fear of legal repercussions may lead them to deny the fact that the deceased person lived in an habitually under-heated residence. The magnitude of such underestimation of the true hypothermia death rates remains unknown.

Previous attempts to estimate the incidence of accidental hypothermia in this country have relied on British estimates since no American studies on the subject existed. Besdine has recently commented that "if American figures are comparable (to British figures), nearly 50,000 old people may be entering our hospitals annually with occult hypothermia, and their survival is largely fortuitous."[11] A recent Massachusetts General Hospital Newsletter states that "each year an estimated 25,000 Americans die as a result of accidental hypothermia."[4] Since the methods of extrapolation are not described, it is impossible to discuss the

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*Glass E, (National Center for Health Statistics): Personal communication, 1979. When hypothermia is reported alone and no indication is given concerning an external cause of injury the coding assignment is made to the residual category 788.9.

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TABLE 1—Deaths and Average Annual Death Rates per 100,000 Estimated Population from Excessive Cold by Age: United States, 1970–79

Age (years)	Deaths	Average Annual Death Rates
All Ages	4826	.227
0–14	114	.021
15–24	312	.079
25–34	305	.101
35–44	459	.197
45–54	801	.341
55–64	941	.477
65–74	848	.616
75–84	706	1.067
85 and over	330	1.799
Not Stated*	10	—

*Figures for age "Not Stated" included in "All Ages" but not distributed among age groups.

adequacy of indirect estimates. The average annual death rates reported in this study suggest a much smaller figure.

From 1972 to 1982, 63 exposure-related hypothermia deaths were reported on death certificates in the District of Columbia and investigated (including autopsy) by the Office of the Chief Medical Examiner.[12] Black men had the highest death rates, White women the lowest rates; the median age of hypothermia victims was 50, and the highest age-specific rate occurred in the 50–54 year range; only one person was less than 32 years old, and seven individuals were age 65 or older. One-third were severely malnourished; one-half had inadequate housing. Some bodies were found in unheated apartments, but most were discovered in abandoned buildings or vehicles. Four-fifths had not been reported missing. One-half had high blood ethanol levels.

Similar research based on intensive case-finding must be conducted in order to understand the causation of this infrequently occurring phenomenon. Coroners' reports and hospital records represent the starting point for investigating how medical and socioeconomic factors interact to increase individual susceptibility to cold exposure.

TABLE 2—Deaths and Average Annual Death Rates per 100,000 Estimated Population from Excessive Cold by Age, Color, and Sex: United States, 1970–79*

	Color and Sex			
Age (years)	White Male	White Female	Non-White Male	Non-White Female
0–34	(360) .07	(86) .02	(228) .25	(57) .06
35–64	(1038) .36	(271) .09	(735) 2.17	(157) .40
65–74	(449) .83	(131) .19	(213) 3.66	(55) .76
75 and over	(481) 1.69	(301) .61	(167) 5.92	(87) 2.13

*Figures for total number of deaths reported in 1970–79 period in specified population groups shown in parentheses preceding average annual death rates.

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