H119 Hypothermia Deaths Due to Environmental Exposure in King County, Washington

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After attending this presentation, attendees will be able to explain the contributing variables in hypothermia deaths in vulnerable populations and describe the paramount importance of scene and circumstances in determining cause of death in the absence of specific anatomic markers.

This presentation will impact the forensic science community by emphasizing the importance of scene and circumstances in determining cause of death in cases of environmental exposure in the absence of specific anatomic findings related to hypothermia. This study has important implications for public health and public policies related to homelessness and protecting vulnerable populations.

The Pacific Northwest has a temperate climate without extremes of temperature, yet hypothermia deaths due to environmental exposure are not uncommon. Data from the King County Medical Examiner's Office (KCMEO) in Seattle, WA, were examined to better understand the contributing factors in hypothermia and the criteria used to determine cause of death.

Methods and Materials: KCMEO records from 2005 through 2016 were selected for all deaths due to hypothermia from environmental exposure. Cases were reviewed in addition to toxicology reports for cause and manner of death, demographics, detailed circumstances, and potential contributing factors. Historical weather data were obtained for each date of death or date of discovery for cases dying in the hospital. Population data were obtained from the 2010 United States Census, and estimates of the homeless population were obtained from local statistics. To assess the specificity of gastric Wischnewski lesions in hypothermia deaths, all autopsy reports for the same time interval containing the term "Wischnewski" were reviewed.

Results: There were a total of 101 cases identified. The annual rate ranged from 5 to 16 per year with a maximum of 16 in 2015. Deaths occurred during all months of the year, with a peak of 32 deaths in December. Daily minimum temperatures associated with each death ranged from 16°F to 56°F with a median of 39°F. The male:female ratio was 69:32. Ages ranged from 24 to 95 years with a median of 57 years. The racial distribution was as follows: 85 White, 6 Black, 4 Asian/Pacific Islander, 5 Native American, and 1 Other. Of all cases, 87 were dead at the scene and 14 were found alive but subsequently died in the hospital. Decedents were found indoors in 15 cases and outdoors in 86 cases. Of those found indoors, all were living alone, and 5 were aged 75 years or older. Altogether, 32 were considered homeless. Based on homeless estimates in King County, this represents an incidence of hypothermia death among the homeless of up to 56 per 100,000 in 2015, compared with 0.76 per 100,000 in the general population. Evidence of intoxication was present in 46 cases. Non-toxic causes of potential incapacitation, ranging from trauma to dementia, were documented in 28 cases. Wischnewski lesions were documented in 25 cases of hypothermia death and in 25 autopsies unrelated to hypothermia. Additional analysis of circumstances found one or more factors that may have contributed to death as follows: 32 were homeless; at least 8 were living indoors in an unheated residence; 65 were incapacitated by intoxicants, injury, and/or natural disease; 7 had underlying dementia or psychiatric illness; and 2 were involved in a motor vehicle collision with a prolonged interval of discovery. Only two cases were engaged in outdoor recreational activities. Paradoxical undressing and/or burrowing were not appreciable features in this study.

Discussion and Conclusions: In this study, the certification of death due to environmental exposure was made by consideration of scene and circumstances. Wischnewski lesions were not found to be a reliable indicator of hypothermia death. Moreover, hypothermia deaths in King County were not necessarily associated with freezing temperatures, indicating that winter in maritime temperate climates may present an unexpected hazard for vulnerable populations, including the homeless and the indigent elderly living alone. Intoxication increases vulnerability as do non-toxic causes of incapacitation, such as underlying dementia or natural disease. Overall, the findings of this study have important implications for public health and welfare services designed for protecting vulnerable populations. As the homeless population in King County continues to rise, it becomes increasingly important to monitor hypothermia deaths as a measure of public policy.

Systemic Hypothermia, Environmental Cold Exposure, Homelessness

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