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BRIEF COMMUNICATION

Mortality Among Fire Fighters: A 27 State Survey*

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INTRODUCTION

There have been several recent reports describing the mortality of fire fighters, the most recent a report by Guidotti in the June 1993 issue of AJIM [Vena and Fiedler, 1987; Heyer et al., 1990; Beaumont et al., 1991; Demers et al., 1992; Guidotti, 1993]. They are cohort studies from one or more U.S. or Canadian cities. The geographical bases and sample sizes are small; the deaths occurred over a wide range of years. In addition, a morbidity study reported cancer incidence from a state cancer registry [Sama et al., 1990]. Through a collaborative effort with the National Center for Health Statistics, the National Cancer Institute, and state health departments, the National Institute for Occupational Safety and Health maintains a large database that includes coded occupation data from death certificates with wide geographical coverage of the United States [Rosenberg et al., 1993]. The National Occupational Mortality Surveillance (NOMS) system includes data from 28 states for one or more years from 1979 to 1990. While our dataset does not have information on length of employment or estimates of exposures, the size of the dataset, the broad geographical coverage, and the recent date of death of the cases provide strengths not available in the recent studies.

We assessed the mortality experience of fire fighters using information from NOMS for 27 states,[1] 1984–1990. There were 5,744 deaths among white male fire fighters. We computed proportionate mortality ratios (PMRs) by comparing the proportion of deaths from specific causes as compared to all causes in fire fighters, with a parallel estimate for all decedents. Age-adjusted PMRs were computed for all ages

[1]Alaska, Colorado, Georgia, Idaho, Indiana, Kansas, Kentucky, Maine, Missouri, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York except New York City, North Carolina, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, Tennessee, Utah, Vermont, Washington, West Virginia, and Wisconsin.

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TABLE I. Summary of Mortality Experience for Fire Fighters From 27 States: 1984–1990*

Cause of death (ICD9 codes)	Under age 65			Total		
	Deaths	PMR	95% CI	Deaths	PMR	95% CI
Malignant neoplasms (140–208)	663	112	104,121	1636	110	106,114
Rectum (154)	18	186	110,294	37	148	105,205
Lung (162)	236	98	86,112	562	102	94,111
Skin (172)	24	167	107,248	38	163	115,223
Bladder (188)	9	101	46,193	37	99	70,137
Kidney (189.0–189.2)	24	141	90,210	53	144	108,189
Brain and nervous system (191–192)	19	85	52,134	38	103	73,141
Lymphatic and hematopoetic (200–208)	85	161	129,199	169	130	111,151
Non-Hodgkin's lymphomas (200,202)	35	161	112,224	66	132	102,167
Multiple myeloma (203)	11	136	68,243	34	148	102,207
Leukemia (204–208)	33	171	118,240	61	119	91,153
Diabetes mellitus (250)	19	54	32,84	80	83	66,104
Ischemic heart disease (410–414)	555	104	95,113	1608	101	97,105
COPD (490–496)	52	83	62,109	238	83	73,94
External causes (E800–E999)	291	104	93,117	383	101	91,112
Accidental falls (E880–E888)	22	206	129,312	45	149	109,199
Fire-related accidents (E890–E899)	23	335	212,502	25	242	157,357
Alcohol-related deaths[a]	31	61	41,86	45	66	48,88
Drug-related deaths[b]	4	27	7,69	7	42	17,87

*The NOMS system includes data for 2 or more years from 27 of the 36 states currently coding the occupation data from death certificates.
[a]ICD codes 291,303,305.0,357.5,425.5,535.3,571.0–571.3,790.3,E860.0,E860.1.
[b]ICD codes 292,304,305.2–305.9,E850–E858,E950.0–E950.5,E962.0,E980.0–E980.5.
PMR, proportionate mortality ratios; CI, confidence interval.

and for deaths occurring before 65, by race and sex. Highlights of these results are presented in Table I. Complete results are available on request.

Guidotti [1993] makes a particular point that his study finds little evidence that fire fighters have high risks for mortality from the three diseases suspected to be associated with exposures experienced by fire fighters: lung cancer, ischemic heart disease, and chronic obstructive pulmonary disease (COPD). While the results of our study (lung cancer: PMR = 102, 95% confidence interval [CI] = 94–111; ischemic heart disease: PMR = 101, 95% CI = 97–105; COPD: PMR = 83, 95% CI = 73–94) are consistent with Guidotti's, mortality studies may not be appropriate for examining heart and lung disease. The unexceptional findings for these causes of death may represent an excess occupational hazard superimposed upon a healthy population. In support of this, the deficit seen in our study for diabetes mortality is one indication of a healthy worker effect among fire fighters. In addition, while death certificates have been shown to have a high degree of accuracy for most neoplasms, they are somewhat less accurate for other causes of death, especially lung diseases [Schottenfeld et al., 1982; Kircher et al., 1985].

Guidotti's [1993] findings of excesses of cancer for bladder, kidney, and ureter are partially supported by our results for kidney cancer. The brain cancer excess was not seen. The excesses of deaths from leukemia, lymphoma, and multiple myeloma in our study were striking and should raise questions about etiology, since benzene has been shown to be a common exposure [Treitman et al., 1980; Brandt-Rauf et al., 1988]. We found high risks for rectal cancer and malignant melanoma of the skin. The rectal cancer excess was also seen in three recent studies, although the results

were not statistically significant [Vena and Fiedler, 1987; Sama et al., 1990; Beaumont et al., 1991]. Results for malignant melanoma of the skin were elevated in two of the studies [Sama et al., 1990; Beaumont et al., 1991]. As in Guidotti's study, an expected excess of deaths from fire-related accidents was seen. We also found a high risk for accidental falls, as did the study by Beaumont et al. [1991]. Low risks were seen for alcohol and drug-related deaths.

This is a large study including more than 5,700 deaths compared to less than 1,000 in most studies of fire fighters. The study also has more recent data and a broad geographical distribution. It demonstrates the value of routine national surveillance of mortality by occupation and industry as well as cause of death. However, occupational mortality data are not without limitations. The information on occupation listed on the death certificate may be inaccurate, especially for an occupational group that routinely retires early and may pursue other jobs [Selikoff, 1992]. There is no information on possible confounders, such as smoking and alcohol use. There is no information on length of employment or possible occupational exposures. In addition, the PMR method of estimating risk will overestimate risk if the overall death rate for the occupational group is low, as might be true of fire fighters [DeCouflé et al., 1980].

This study adds to the evidence that fire fighters are at excess risk of certain causes of mortality. Further morbidity studies of these and other causes of death left unresolved by mortality studies are needed, as well as the development and implementation of appropriate interventions to protect fire fighters.

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