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MESOTHELIOMA IN SHIPYARD WORKERS OF PUGET SOUND, WASHINGTON

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Mesothelioma in Shipyard Workers of Puget Sound, Washington

Mesothelioma of the pleura and peritoneum is still considered a rather rare pathologic entity, although there is evidence that the incidence is increasing (1). The association of mesothelioma with exposure to asbestos has been confirmed and found to be very strong for many parts of the world (2). Workers in shipyard occupations, where asbestos has been extensively used for insulation of the steam plant of ships, have been demonstrated to have an increased risk of mesothelioma by several investigators (2).

The purpose of this study is to document the expected excess of mesothelioma among shipyard workers of the Puget Sound area in Washington State and to demonstrate the simplicity of doing so using only readily available vital statistics documents.

Methods

All death certificates with mesothelioma listed as a cause of death were identified for the years 1968 through 1976 for four counties in the Puget Sound region of Washington. From each death certificate, the age and usual occupation of the case were obtained. Two matched controls were chosen for each case. Proceeding forward in the death files, the certificates chosen as controls were the first two which matched the case certificate for sex, ten-year age group and county of residence at death and with a diagnosis other than mesothelioma.

Tests of significance were performed according to the methods of Miettinen as recommended for individual matching with two or more controls (3).

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Results

The number of mesothelioma cases by sex and by year are presented in Table I and by sex and by age in Table II.

The distribution of cases among the four counties and approximate county death rates based on 1970 census figures are shown in Table III.

The analysis of occupation revealed no significant results for females nor for male residents of Pierce or Snohomish counties. However, analysis of occupation of male residents of King and Kitsap Counties indicated that 30.3% of cases were employees of the Puget Sound Naval Shipyard (PSNS) in Bremerton, Washington (Kitsap County) as compared to only 7.6% of controls (Table IV). With a two-tailed test and continuity correction applied, this is a significant difference ($p<0.01$).

A similar analysis of Kitsap County cases alone (Table V) also shows a significant excess of cases to be employees of PSNS (88.9% of cases versus only 22.2% of controls). Analysis of King County cases alone does show an excess of PSNS employees (8.3% of cases versus 2.1% of controls), but the difference is not significant.

Discussion

The results of this study are in agreement with previous investigations which indicated that shipyard workers are at increased risk of developing mesothelioma (2). This is, however, the first published report of the association between shipyard workers of the Pacific Northwest and mesothelioma and indicates a small epidemic of mesothelioma cases in Kitsap County, Washington.

References

1. Bruckman L., Rubino R.A. and Christine B., Asbestos and Mesothelioma Incidence in Connecticut, J Air Poll Control Assoc, 27:121-126, 1977.

2. Becklake M.R., Asbestos Related Diseases of the Lungs and Other Organs, Am Rev Resp Dis, 114:187-227, 1976.

3. Miettinen O.S., Individual Matching With Multiple Controls in the Case of All or None Responses, Biometrics, 25:339-355, 1969.

4. Revised Recommended Asbestos Standard, United States Department of Health, Education and Welfare, National Institute of Occupational Safety and Health, U.S. Government Printing Office, Washington, D.C., December, 1976.

TABLE I. Mesothelioma Deaths in Four Puget Sound Counties in Washington, 1968-76

Year	Males	Females	Total
1968	3	1	4
1969	2	1	3
1970	6	1	7
1971	5	0	5
1972	4	0	4
1973	2	0	2
1974	8	2	10
1975	3	5	8
1976	7	2	9
All	40	12	52

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TABLE II. Age Distribution of Mesothelioma Deaths in Four Puget Sound Counties, 1968-76

Age	Males (%)	Females (%)	Total (%)
30-39	0 (0)	2 (16.7)	2 (3.8)
40-49	1 (2.5)	0 (0.0)	1 (1.9)
50-59	9 (22.5)	3 (25.1)	12 (23.1)
60-69	15 (37.5)	4 (33.3)	19 (36.5)
70 +	15 (37.5)	3 (25.1)	18 (34.6)
All	40	12	52

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TABLE III. Mesothelioma Death Rates* in Four Puget Sound Counties, 1968-76

County	Males		Females	
	# Cases	Rate*	# Cases	Rate*
King	24	10.2	7	2.7
Kitsap	9	42.1	1	4.4
Pierce	6	7.8	1	1.2
Snohomish	1	1.9	3	5.6

* per million population age 30 + per year

TABLE IV. Employment by Puget Sound Naval Shipyard of King and Kitsap County Mesothelioma Cases and Controls

		CONTROL EMPLOYED BY PSNS		
		Both	One	Neither
CASE EMPLOYED BY PSNS	Yes	0	3	7
	No	0	2	21

T = 2.76, P< 0.01

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TABLE V. Employment by Puget Sound Naval Shipyard of Kitsap County Mesothelioma Cases and Controls

		CONTROL EMPLOYED BY PSNS		
		Both	One	Neither
CASE EMPLOYED BY PSNS	Yes	0	3	5
	No	0	1	0

T = 2.46, P <0.02

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DEPARTMENT OF THE NAVY
NAVY ENVIRONMENTAL HEALTH CENTER
3333 VINE STREET
CINCINNATI, OHIO 45220

IN REPLY REFER TO
[illegible]/DMM:zll
5100.2
r 8-411
3 August 1978

From: Commanding Officer, Navy Environmental Health Ce.
To: Chief, Bureau of Medicine and Surgery (Code 35)

Subj: Asbestos; strategic stockpiling of

Ref: (a) Article in The Enquirer Magazine, The Cincinnati Enquirer, dtd Sunday, 06 AUG 78
(b) NAVSEAINST 5100.2 of 24 OCT 75

Encl: (1) Copy of reference (a)

1. Reference (a) states the Somerville, NJ depot of the General Services Administration, one of 117 federal stockpiles for strategic commodities, currently maintains 12,000 tons of crude asbestos to meet military and industrial needs in a national emergency. As current policy, reference (b), relating to asbestos requires substitution of alternate materials where available, the maintenance of a stock of asbestos appears counterproductive. A policy of replacing the asbestos with fibrous glass and/or other suitable materials would appear to be more appropriate.

2. The Navy Environmental Health Center (NAVENVIRHLTHCEN) recommends a formal position be taken by the Chief, Bureau of Medicine and Surgery concerning the phased transition within the strategic commodities stockpile from asbestos to a less hazardous substitute. This position could then be transmitted via the chain of command for action by the Departments of Defense and General Services Administration.

3. Please contact the NAVENVIRHLTHCEN (LT D. [illegible]) if additional information or clarification is desired, AV: 850-3863, Commercial: 513/684-3863.

R. [illegible]
Acting

Copy to:
CNO (OP-45)
COMNAVSEASYSCOM (04H)
COMNAVSEC (6101E)

UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

[illegible] DIVISION

August 30, 1978

The Honorable
The Secretary of Defense

Attention: Assistant Secretary of Defense
(Comptroller)

Dear Mr. Secretary:

This letter is to advise you that the [illegible] Office is undertaking a review of asbestos pollution problems at U.S. Naval Shipyards. This work is being done pursuant to a congressional request and will be performed under assignment code [illegible].

We have been requested to obtain information on the extent of asbestos use in the Navy's shipbuilding and repair operations, the conditions of use, and the [illegible] of asbestos with a suitable substitute in all cases [illegible]. As part of this review we plan to do work at [illegible] shipyards, with [illegible] consulting, at the Pacific and Long Beach Naval [illegible] headquarters [illegible] to the [illegible] Secretary of the Navy and the Bureau of Medicine [illegible] to initiate [illegible].

We would appreciate your notifying the [illegible] this review. If you have [illegible] contact Mr. [illegible] of our staff [illegible].

Sincerely,

[illegible]
[illegible]

cc: The Secretary of the Navy
Attn: The Inspector General
Comptroller of the Navy
The Secretary of the Air Force
Attn: [illegible]

WASHINGTON

Dixy Lee Ray
Governor

Olympia, Washington 98504

MEMORANDUM

January 4, 1978

TO: John A. Beare, MD, MPH
Director MS OB-44-J
Health Services Division

FROM: Ward Hinds, M.D.
Occupational Health Section
M.S. LD-11

SUBJECT: MESOTHELIOMA SHIPYARD WORKERS

Attached is a report on an investigation which I have been conducting over the past several months. This investigation was carried out because I have documented that the Puget Sound region of Washington has a very high incidence rate for mesothelioma as compared to that of several other areas in the United States served by comprehensive cancer centers such as the Fred Hutchinson Cancer Research Center. At the American Occupational Health Conference in New Orleans in April 1978, I'll be reporting on my findings by means of a comparison of mesothelioma incidence rates in several areas of the country.

Because of the apparent high incidence of mesothelioma in the Puget Sound area, I felt it was important to determine whether this was likely to be an occupational phenomenon or might be related to exposure to asbestos in the general environment. The attached would seem to indicate that the excess of mesothelioma in the Puget Sound area is indeed an occupational phenomenon which is related primarily to the employment of a large number of workers in the area by the Puget Sound Naval Shipyard. Never the less, because of an interest by the Environmental Protection Agency in the possibilities of cancer resulting from asbestos in the water supply, the Fred Hutchinson Cancer Research Center is sumbitting a grant proposal to study this problem in the Puget Sound area. That study is likely to be funded by EPA and carried out sometime in the next two years. I have a copy of the proposal for review if you wish to see it.

WH:nm

cc: Sam Reed
Terry Strong
Commander Richard Nelson, MC, USN

Encl (1)

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