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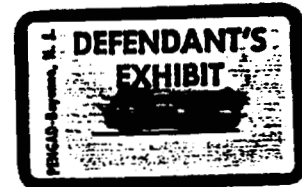
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Cause-Specific Mortality Among Newspaper Web Pressmen

Annlia Paganini-Hill, Ph.D.; Eva Glazer, M.B., ES.; Brian E. Henderson, MD; and Ronald K. Ross, M.D.

A mortality study of 7367 newspaper web pressmen who were members of the Los Angeles Pressmen's Union for at least one year — between 1949 and 1965 — was conducted. Vital status as of December 31, 1978, was determined for 7267 (97%), and death certificates were obtained for 344 of the 354 decedents. Using a modified life-table technique, cause-specific mortality among the pressmen was compared to that in the United States white male population. Overall mortality was similar to that expected. Analysis of the cancer mortality by site showed no significant differences between observed and expected except for leukemia (7 observed vs. 2.8 expected) and kidney cancer (5 observed vs. .76 expected). A significant excess of deaths due to cirrhosis of the liver (17 observed vs. 8.3 expected) was also observed.

Newspaper web pressmen constitute an occupational subgroup in which there is potentially hazardous chemical exposure. These men operate the rotary presses that print a continuous roll of paper called the "web." They are exposed to the atmosphere of the pressroom which contains printing ink, paper dust, lubricating oil and solvents. The high-speed rotating rollers of the presses may accentuate the presence of these substances by filling the pressroom with ink spray and paper fly. The study reported here describes the mortality experience of a cohort of newspaper web pressmen.

Methods

A list of all individuals who were members of a Los Angeles Pressmen's Union at some time between 1949 and 1965 inclusive was obtained from that union. Utilizing the records of the local union and of the International Printing and Graphic Communications Union, the authors attempted to procure for each individual the following information: date of birth, year first worked as pressman, year last worked as pressman, and vital status as of December 31, 1978. From a total of 1,542 individuals who

had been in the union during the specified period, 1,361 met the criteria for inclusion in the mortality study, i.e., they had been employed as pressmen for at least one year (42 eliminated) and their birth dates were known (139 eliminated). The 181 rejected tended to be those who were in the union for only a short period of time (82% less than five years) and therefore are a group with a very short duration of exposure to the pressroom environment. Of the 1,361, vital status was determined for 1,241 (91%). The remainder were initially active workers who subsequently terminated their employment and went to work in other occupations or in non-union shops. All members of the cohort were white males.

Death certificates were recovered for 344 of the 354 known decedents in the cohort, and the underlying cause of death was classified according to the International Classification of Diseases (ICD), Eighth Revision.

A modified life-table technique¹ was used to obtain person-years at risk of dying by ten-year age and five-year calendar groups. The observation period for an individual began with the first year between 1949 and 1965 in which he was a member of the local union. The date last at which he was known to be alive was used as the date of follow-up for the 120 pressmen whose vital status as of December 31, 1978, was unknown. Cause-specific mortality rates for the United States white male population² for 1952, 1957, 1962, 1967, 1972, and 1975 were used to compute expected number of deaths for the study cohort. The expected numbers were calculated by applying the rates specific for age and calendar year group to the set of person-years at risk in that age and calendar year group. Standard mortality ratios (SMRs) were calculated as $\frac{\text{observed}}{\text{expected}} \times 100$.

Results

Table 1 summarizes the duration of employment as pressmen for the men in the study. A high percentage (65%) had worked for 20 or more years, indicating that turnover of active members not due to retirement is relatively slight. Most workers began employment at an early age (Table 2). Therefore, this industrial group is one in which exposure is often continuous and of long duration.

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Table 1 — Distribution by Number of Years Employed as Pressman.

Years Employed	Alive		Dead		Status Unknown	
	No.	%	No.	%	No.	%
1-9	35	4	9	3	49	41
10-19	217	24	23	6	30	25
20-29	354	40	65	18	13	11
30-39	122	21	69	19	0	0
40 +	89	10	115	32	1	0
Unknown	10	1	73	21	27	23
Total	887	100	354	100	120	100

Table 3 shows that the total mortality among web pressmen was eight percent less than expected (344 deaths observed vs. 374 expected). This deficit in mortality extends to most major cause-of-death categories. However, significantly elevated SMRs were seen for kidney cancer, leukemia, and cirrhosis. In this study, the authors were unable to associate the observed excess for either leukemia or kidney cancer to any particular group either by age started work, year started work, total number of years worked or interval since first worked, but the numbers became very small when these variables were stratified.

Discussion

Seven deaths from leukemia were observed, which represented a significant excess over the 28 expected six of the seven leukemias were of the myelomonocytic type. In addition, myeloid leukemia was mentioned in the secondary role on the death certificate of one pressman and one other had myelofibrosis.

An excess in leukemia mortality among pressmen is also evident in the 1951 Registrar General's Occupational Mortality Report.⁵ Lloyd et al.⁶ found a modest increase in the number of deaths from leukemia (8 observed vs. 5.1 expected) in a proportional mortality study of newspaper pressmen while Viadana and Bross⁷ found evidence of an excess of leukemia incidence among printers over the years 1959 to 1962 (a relative risk of 1.9 for printers vs. clerks).

There is strong epidemiological and clinical evidence of an association between benzene exposure and risk to leukemia. Infante et al.⁸ reported a fivefold excess risk of all leukemias and ten-fold excess of deaths from myeloid and monocytic leukemia among pliofilm workers exposed to benzene. Earlier published case reports were tabulated by Browning⁹ who showed that there was a consistency in the histologic types (myelogenous and monocytic) of benzene-induced leukemias. In the past, benzene has been used in pressrooms as a solvent and in ink formulation. Although toluene and other hydrocarbon

solvents have now been substituted for benzene, this chemical may still be present as a process impurity.¹⁰

While an excess number of deaths due to bladder cancer among those in the printing industry has been observed,^{11,12} no unusual mortality due to kidney cancer has been reported previously. Black printing ink is composed of approximately two percent carbon black and one percent asphalt dispensed with mineral oil and solvents. Colored printing ink contains additional pigments and dyes, and findings in laboratory animals have suggested that kidney damage may result from exposure to lead pigments and to benzidine-based colorants.¹³ In addition, of the 37 most commonly used coloring pigments and dyes found in printing ink, four (lead chromate, lead chromate-lead molybdate, carbon black, and cadmium sulfate) are carcinogenic in humans or animals.¹⁰ Additional studies of newspaper pressmen are needed to verify the association with renal cancer reported here.

The finding in this study of an excess of 105% for deaths due to cirrhosis agrees with the excess for deaths due to cirrhosis found by Lloyd et al.⁶ This excess may in part explain the low SMR seen for prostate cancer, as this inverse relationship has been reported previously.^{14,15}

Several investigators have reported excess lung cancer mortality among workers in the printing industry.^{16,21} However the few previous studies of mortality among newspaper pressmen exclusively have observed no excess of lung cancer,²² and this report substantiates such findings. Although air levels of oil mists in the pressrooms of newspaper plants have been measured as high as 21 mg/cu m,^{22,23} these high levels apparently create no unusual lung cancer risk. The finding of an increase in deaths from oral cancer by Lloyd et al.⁶ was also not substantiated.

The choice of general population death rates for calculating the expected number of deaths in this occupational group introduces an overestimation of expected mortality. This observed deficit of deaths has been called the "healthy worker effect."^{24,25} Thus, the slightly

Table 2 — Distribution by Age Started to Work as Pressman.

Age Started Work	Alive		Dead		Status Unknown	
	No.	%	No.	%	No.	%
< 24	456	53	112	32	47	39
25-34	358	40	104	29	50	42
35 +	63	7	42	12	19	16
Unknown	0	0	96	27	4	3
Total	887	100	354	100	120	100

Table 3. — Cause Specific Mortality Experience Among Cohort of Newspaper Pressmen

Cause at Death	ICD Code	Obs	Exp	SMR
All causes		344	374.0	92
All malignant neoplasms	140-209	68	69.0	98
buccal and pharyngeal	140-149	2	2.2	92
Lung and trachea	162	2	14.6	149
Esophageal	150		1.6	62
Stomach	151		4.3	70
Colon-rectum	153-154	8	8.9	90
Liver	155		0.9	112
Pancreas	157		3.8	129
Prostate	185		5.4	74
Kidney	189	5	1.6	303*
Bladder	188	1	2.4	85
Leukemia	204-207		2.8	247*
Other lymphatic and hematopoietic neoplasms	202-233 208-239	5	3.9	129
Cardiovascular disease	393-458	195	205.8	95
Influenza and pneumonia	470-486		9.6	72
Ulcer	531-532	1	2.8	36
Hernia intestinal obstruction	550-560	1	1.2	83
Cirrhosis	571	17	8.3	205*
Tuberculosis and neoplasms	580-584		2.4	206
Accidents	E800-929	13	21.8	60
Suicide and homicide	E950-969	12	9.2	131
All other causes		25	44.0	56†

* $p < 0.05$ † $p < 0.01$

decreased total mortality of the web pressmen is not surprising and is similar to results from many other studies of industrial populations." 27 28

Follow-up was attempted on all individuals, including those who had left the union to work at other occupations or in non-union shops. However, as most deaths were obtained from among those entitled to union death benefits, following the others only to the point where they left the union might introduce a bias. One might miss deaths due to chronic diseases (if an individual had left the union because of ill health) but most likely not deaths due to acute diseases. If such a bias does exist, it is unlikely that it would create any false associations, but it could mask some that do exist.

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