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Workers' Compensation for Nonmalignant Asbestos-Related Lung Disease

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Workers' compensation claims filed for occupational illness are generally more complicated to resolve than are injury claims, and they may therefore face higher likelihood of rejection. This study analyzed outcomes and predictive factors for claims filed from one clinic in Washington State between 1982 and 1986 by 157 male patients for nonmalignant asbestos-related lung disease. Among 50 federal Longshore claims, 46 (92%) were unresolved or could not be located by claims administrators. In contrast, 118 (89%) of State Fund claims had been resolved, with 48% accepted without consistent relationship to disease severity. Claims filed under both jurisdictions showed a twofold greater risk of rejection by the State Fund (relative risk, RR = 2.0; 95% confidence interval, 95% CI = 1.3–3.2). State Fund claims filed for nonwhite patients were rejected more often than those of white patients, although the association was explained at least partially by jurisdictional overlap (adjusted RR = 1.5; 95% CI = 1.05–2.1). This study indicates a need to scrutinize the handling of occupational disease claims by the federal Longshore system and to consider the adverse influences of jurisdictional conflicts and possible race-associated factors on compensation of occupational illness.

Key words: asbestosis, asbestos, occupational diseases, workers' compensation, race differential

INTRODUCTION

In 1978, the U.S. Department of Labor concluded that workers' compensation benefits do not reach the majority of people who are disabled by occupational disease [Brown, 1988]. Occupational disease claims, in comparison to claims filed for accidents, are more likely to be contested, take longer to settle, and more often end in compromise settlements [Barth and Hunt, 1982; Cooper & Co., 1976].

Asbestos-related disease can be viewed as a prototype of many chronic occupational diseases. It is well recognized that asbestos exposure can cause a serious, irreversible, and often disabling pulmonary disease, asbestosis, in addition to lung

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cancer and an otherwise rare cancer, diffuse malignant mesothelioma [Becklake, 1982]. Asbestos can also cause pleural fibrosis, which can be associated with usually minimal impairment [Rosenstock et al., 1988], but, even in the absence of impairment, is a clear marker of asbestos effect. The diagnosis of nonmalignant asbestos-related disease can be made objectively on the basis of exposure history, findings on physical examination, chest roentgenograph, and pulmonary function tests [ATS, 1986]. However, resolution of workers' compensation claims filed for these conditions may be complicated by a number of factors, including the occurrence of asbestos exposures in multiple previous jobs under more than one workers' compensation jurisdiction, the inherently long latency periods between earliest asbestos exposures and development of disease, and the concomitant occurrence of nonoccupational health conditions that may impair respiratory or total body function. Claims filed for nonmalignant asbestos-related disease, therefore, provide a relatively discrete diagnostic example for evaluating the ability of workers' compensation systems to deal with occupational disease in general. In order to assess the effects of several of these factors on claims outcome, we undertook a study of a cohort of patients who had initiated workers' compensation claims for nonmalignant asbestos-related conditions.

MATERIALS AND METHODS

Study Population

This study retrospectively examined the experience of a group of patients who filed workers' compensation claims for nonmalignant asbestos-related disease between July 1, 1982 and July 1, 1986 at the University of Washington Occupational Medicine Clinic (n = 168). Washington State directly insures the majority of Washington workers, but some people who have worked in shipyards or as federal employees are insured through federal compensation systems. After excluding nine patients who had died or developed cancer during the study period and the only two female patients, clinical and workers' compensation records were reviewed for the 157 eligible male patients.

Data Collection

Clinic computer data files and clinic medical charts were used to obtain background and diagnostic data. Available background variables included age, race, gender, usual job, years since first known asbestos exposure ("latency"), smoking history, date workers' compensation claim(s) were filed, and specific systems under which claim(s) were filed ("jurisdiction"). Race was considered dichotomously as either white or nonwhite (95% of the 40 nonwhite patients were black). The 23 jobs represented in the cohort were categorized as plumber/pipefitter (50%), shipscaler (15%), and others (35%). Three mutually exclusive "jurisdictional" groups were defined in the subject sample based on whether clinic records showed that a patient had filed a claim under the State Fund only (SF ONLY, n = 64), under both the State Fund and the federal workers' compensation system created by the Longshore and Harborworkers Act (SF+FED, n = 68), or only under a federal system (FED ONLY, n = 25).

Collection of diagnostic data was restricted to results of tests performed within 1 year of the workers' compensation filing date. The presence or absence of pleural thickening and/or pulmonary interstitial opacification on chest roentgenograph was based on the clinic attending physician's interpretation using categories established by

the International Labor Organization (ILO) [1980], or when ILO categorization had not been made, based on qualitative radiographic readings (e.g., pulmonary interstitial markings described as "abnormally increased" or "consistent with parenchymal fibrosis"). Forced vital capacity (FVC), forced expiratory volume at 1 sec (FEV_1), and forced expiratory flow between 25–75% vital capacity (FEF_{25-75}) were available for each patient; spirometry was performed in clinic, in accordance with the criteria of the American Thoracic Society [1979]. Total lung capacity (TLC) and diffusion capacity (DLCO), performed by the hospital Pulmonary Function Laboratory, were additionally available for 138 patients (88%). Predicted "normal" ranges for pulmonary function parameters were defined relative to previously described normative equations based on gender, age, and height [Crapo et al., 1981, 1982; Crapo and Morris, 1981] separately using "low" cut-offs at either the respective one-sided 95% confidence interval or 80% predicted value, and making adjustments of −10% for nonwhite patients, in accordance with recommendations of the American Medical Association (AMA) [1984, 1988]. The prevalence of "low" FVC values was nearly twice that of "low" TLC values, even more so for FVC values categorized relative to the 80% predicted value rather than the 95% confidence interval, and the latter cut-off was used for reporting "low" values in Results. Mutually exclusive categories of *possible* respiratory dysfunction were defined as: "obstructive" (normal TLC and either low FEV_1/FVC or low FEV_1), "restrictive" (low TLC and normal FEV_1/FVC), "mixed obstructive-restrictive" (low TLC and low FEV_1/FVC), "low diffusion capacity (only)," or "small airways dysfunction" (normal TLC, FEV_1 and FEV_1/FVC; low FEF_{25-75}).

The outcomes (acceptance or rejection) of claims filed for 132 patients who filed with the Washington State Fund were determined using the State Department of Labor & Industries administrative data base. The close of the study period was July 1, 1988, which allowed a minimum 2-year period between claim filing and determination of claim status. Five patients still had claims pending, and nine had no record of a claim having been filed, resulting in State Fund claim outcome data being available for 118 (89%) patients.

An attempt was made to obtain claim outcome information for 89 patients who had filed under the Longshore and Harborworkers' Act. In response to the stated Longshore policy that written patient consent be presented for release of any claim information, even to filing physicians, consent forms were sent to all Longshore patient-claimants. Recorded addresses were up to 6 years old, and some mailed materials were returned as nondeliverable. Fifty (56%) forms were signed and returned and were then forwarded to the Longshore administrators. The administrators were able to locate files for only 18 (36%) of these claims.

Thirty patients filed claims under the Federal Employees Compensation Act, including five filed jointly with the State Fund (one of these five filed additionally under the Longshore system). Because of their small number, data were not collected regarding outcomes of the Federal Employee claims.

Data Analysis

Continuous data were compared between groups using Student's t-test or analysis of variance. Dichotomous variables were analyzed using single or stratified two-by-two contingency tables and either chi-square or Fisher's exact tests. Relative risks ("RR") and variance-based 95% confidence intervals ("95% CI") were cal-

culated to facilitate comparisons [Mantel and Haenszel, 1959; Greenland and Robins, 1985].

RESULTS

The patients did not differ significantly between the three jurisdictional groups (State Fund only, Federal only, and both) in terms of age, smoking history, and most diagnostic test results (Table I), including obstructive dysfunction on spirometry ("Obstruction" and "Mixed," Table I). Spirometry results suggested that "restrictive" dysfunction (based on FEV1, and FVC, rather than TLC) was less prevalent in the SF ONLY group overall and more specifically within the subgroup with mixed dysfunction (data not shown). However, full pulmonary function tests, which were performed in 88% of patients, did not confirm this trend and showed no differences between groups in the prevalence of restrictive dysfunction ("restriction" plus "mixed"). There was a tendency for interstitial opacification on chest roentgenograph and abnormal diffusion capacity (DLCO) to be less evident in the SF ONLY group and more evident in the FED ONLY group, but these differences were not statistically significant. Nonwhite patients had been employed as shipyard workers more often than had white patients (52% vs. 2%, respectively, had been shipscalers), and nonwhite patients also were disproportionately represented in the SF + FED and FED ONLY groups, consistent with the fact that shipyard employment is generally covered by one of the federal compensation systems. The overall high prevalence of plumbers/pipefitters in this study sample was a consequence of case identification through a union-sponsored screening program conducted by this clinic.

Analysis of Longshore claims (89 of the 94 federal claims filed) was limited because of the nonavailability of outcome data. The administrators gave no information regarding the status of 39 claims for which the investigators did not have their patient's current written consent for release of information (44%). Among the remaining 50 claims, most were reported either to have had no corresponding records in Longshore files (n = 32, 64%), or to be still unresolved (n = 14, 28%). All claims acknowledged by Longshore administrators had been contested initially by employers; and only four claims (8%) had been resolved: two had been withdrawn by the patients, and two had been settled after compromise agreement. No further analyses of Longshore claims were feasible, and the remainder of data analysis focused on patients who had filed a claim with the State Fund and whose claim had been accepted or rejected by the close of the study period.

In contrast to the nonresolution or inability to locate most Longshore claims, 48% (n = 64) of the 132 claims filed with the State Fund had been accepted, 41% (n = 54) had been rejected, and only a small proportion were missing (n = 9, 7%) or unresolved (n = 5, 4%). The patients with accepted or rejected State Fund claims did not differ in terms of most background and clinical parameters examined in this study, including measures of the severity of asbestos disease (Table II). There was no significant association between claim outcome and abnormal chest roentgenographic findings, although the more definitive interstitial opacifications ($\geq$ ILO 1/1) actually tended to be more prevalent among rejected claims. Restrictive dysfunction was about twice as prevalent in the Accepted group as in the Rejected group ("restriction" + "mixed", 23% vs. 12%, respectively), and low diffusion capacity showed a similar pattern; however, these differences did not achieve statistical significance. The de-

TABLE I. Background and Diagnostic Information Within Jurisdictional Groups in Survey of Workers' Compensation Claims for Asbestos Disease, Washington State, 1982–1986*

	SF ONLY (n = 64)	SF+FED (n = 68)	FED ONLY (n = 25)
Claims filed			
State Fund	64	68	—
Longshore	—	64	25
Other federal	—	5[a]	0
Exposure history			
Plumber/pipefitter	46 (72%)	29 (43%)	4 (16%)
Shipscaler	2 (3%)	13 (19%)	8 (32%)
Other	16 (25%)	26 (38%)	13 (52%)
Age (years)	61.4 ± 9.8	63.5 ± 9.1	61.6 ± 11.4
Latency (years)	33.6 ± 9.4	35.7 ± 8.9	33.0 ± 10.5
Race			
White	57 (89%)	49 (72%)	11 (44%)
Nonwhite	7 (11%)	19 (28%)	14 (56%)
Smoking status			
Current	20 (31%)	21 (31%)	11 (44%)
Ever	54 (84%)	56 (82%)	20 (80%)
Never	10 (16%)	12 (18%)	5 (20%)
Chest roentgenograph			
Interstitial opacification[b]	41 (64%)	53 (78%)	21 (84%)
ILO = 1/0	17 (27%)	18 (26%)	11 (44%)
ILO ≥ 1/1	11 (17%)	23 (34%)	6 (24%)
"fibrosis" (no ILO)	13 (20%)	12 (18%)	4 (16%)
Pleural thickening	60 (94%)	59 (87%)	22 (88%)
Pulmonary function Parameters ("low")[c]			
FVC	19 (30%)	27 (40%)	11 (44%)
FEV_1	28 (44%)	34 (50%)	13 (52%)
FEV_1/FVC	16 (25%)	22 (32%)	6 (24%)
TLC	10/56 (18%)	9/61 (15%)	3/21 (14%)
DLCO	34/55 (62%)	40/60 (67%)	15/20 (75%)
Pulmonary dysfunction[d]	[n = 56]	[n = 61]	[n = 21]
None	12 (21%)	12 (20%)	1 (5%)
Obstruction	22 (39%)	25 (41%)	9 (43%)
Restriction	9 (16%)	6 (10%)	2 (10%)
Mixed (obst/rest)	1 (2%)	3 (5%)	1 (5%)
Low DLCO (only)	12 (21%)	15 (25%)	8 (38%)

*Jurisdictional groups were defined on the basis of claim filing: "SF ONLY" = filed only with State Fund; "SF+FED" = filed with State Fund and a federal system; "FED ONLY" = filed with a federal system only. Table shows numbers of patients (and percentage in parentheses), except for Age and Latency, which are expressed as mean ± standard deviation.

[a]Note that one patient filed federal claims under both Longshore and OWCP systems (thus, 64 + 5 = 69, not 68).

[b]Interstitial opacification was preferentially classified within ILO categories, when ILO rating was documented; otherwise, it was dichotomized according to the attending or radiologist qualitative interpretation.

[c]Measured values were "low" if less than the one-sided 95% confidence interval around the race-adjusted predicted value (Crapo).

[d]Categorization of "pulmonary dysfunction" is described in Materials and Methods; restriction was defined by low TLC (not low FVC).

TABLE II. State Fund Claim Outcome Relative to Jurisdiction, Background and Diagnostic Variables, Washington State 1982–1986*

	Accepted (n = 64)	Rejected[a] (n = 54)
Jurisdiction		
SF ONLY	42 (66%)	17 (31%)++
SF + FED	22 (34%)	37 (69%)
Exposure history		
Plumber/pipefitter	46 (72%)	19 (35%)++
Shipscaler	3 (5%)	10 (19%)
Other	15 (23%)	25 (46%)
Age (years)	62.3 ± 9.9	62.6 ± 9.7
Latency (years)	34.3 ± 9.4	34.5 ± 8.8
Race		
White	57 (89%)	38 (70%)+
Nonwhite	7 (11%)	16 (30%)
Smoking status		
Current	16 (25%)	18 (33%)
Ever	51 (80%)	46 (85%)
Never	13 (20%)	8 (15%)
Chest roentgenograph		
Interstitial opacification	43 (67%)	40 (74%)
ILO = 1/0	17 (27%)	11 (20%)
ILO ≥ 1/1	13 (20%)	19 (35%)
"fibrosis"	13 (20%)	10 (19%)
Pleural thickening	58 (91%)	48 (89%)
Pulmonary dysfunction	[n = 56]	[n = 49]
None	11 (20%)	10 (20%)
Obstruction	17 (30%)	23 (47%)
Restriction	9 (16%)	6 (12%)
Mixed (obst/rest)	4 (7%)	0
Low DLCO (only)	15 (27%)	10 (20%)

*See footnotes for Table I.
[a]Intergroup differences not statistically significant ($p > .10$), other than when designated by superscript: "+" $p < .01$; "++" $p < .001$.

gree of abnormality for these pulmonary function parameters also showed no significant or predictable association with claim outcome, whether tested numerically or categorically. The prevalence of DLCO below 60% predicted was more than twofold greater in the rejected than accepted groups (36% vs. 14%). Only four patients had TLC values < 60% predicted (3 accepted, 1 rejected); and only five patients (2 accepted, 3 rejected) had DLCO values ≤ 40% predicted (the then-current single DLCO criterion for impairment [AMA, 1984; WAC, 1986]).

There was also no significant association between claim outcome and either concurrent obstructive pulmonary disease, or current or past tobacco use (Table II). Although obstructive dysfunction, particularly in the absence of restrictive dysfunction, tended to be more prevalent in the Rejected group, the difference was not statistically significant. Also, the likelihood of claims acceptance with either restrictive dysfunction or low diffusion capacity was not significantly altered by the presence or degree of obstructive dysfunction.

TABLE III. Prevalence of State Fund Claim Rejection Relative to Jurisdiction and Race, Washington State, 1982–1986

	Claim jurisdiction[a]		
	SF ONLY (n = 59)	SF + FED (n = 59)	All claims
Race			
White (n = 95)	14/52 (27%)	24/43 (56%)	38/95 (40%)
Nonwhite (n = 23)	3/7 (43%)	13/16 (81%)	16/23 (70%)
All claims	17/59 (29%)	37/59 (63%)	54/118 (46%)

[a]"SF ONLY" = filed only with State Fund; "SF + FED" = filed with State Fund and a federal system.

Claim rejection, however, was strongly associated with jurisdictional status, job exposure history, and race (Table II). State Fund claims were rejected significantly more often among SF + FED group patients relative to the SF ONLY group (RR = 2.2, 95% CI = 1.4–3.4), among shipscalers compared to other job types (RR = 1.8, 95% CI = 1.3–2.7), and among nonwhite relative to white patients (RR = 1.7, 95% CI = 1.2–2.5).

The association between State Fund claim outcome and race appeared to be at least partially explained by jurisdictional conflict (Table III). The risk for claim rejection related to jurisdictional conflict persisted even after controlling for possible race-associated influences (stratified RR, "sRR" = 2.0, 95% CI = 1.3–3.2), but the race-associated risk for claim rejection was less pronounced after adjustment for the apparent confounding influence of jurisdiction (sRR = 1.5, 95% CI = 1.05–2.1). There were no significant differences between white and nonwhite patients for other potential predictor variables, such as disease severity and smoking status. It is also noteworthy that claims were rejected for 13 of 16 nonwhite patients (81%) vs. 24 of 43 white patients (56%) in the SF + FED group (RR = 1.5, 95% CI = 1.02–2.1).

DISCUSSION

This study identified factors that appeared to influence resolution of workers' compensation claims filed for nonmalignant asbestos-related lung diseases during the period studied, even though those factors were not directly related to disease status. Patients who had filed claims under the Washington State Fund and also under another system were twice as likely to have their claims rejected as were patients who had filed only under the State Fund. In recognition of the problem of individuals filing claims under multiple jurisdictions being denied benefits from all involved jurisdictions, the State Fund since 1988 has provisionally covered expenses for all valid asbestos-related disease claims coming potentially under its jurisdiction. The effectiveness of this policy was to be assessed in 1992 by the Washington State Department of Labor and Industries [1987].

In this study sample, the handling of claims filed under the Longshore and Harborworkers' Act appeared to be grossly inadequate, particularly in comparison to claims processing by the State Fund. The Longshore administrators would release claim status information to filing physicians only with formal, written consent from the patient for release of information. Unfortunately, consent forms were not signed and returned by 44% of the Longshore claimants contacted in a single mailing. This

relatively large magnitude of "nonresponse" is understandable, given that a major proportion of patients had been seen at this clinic only once, to be told they had a nontreatable condition and then had no subsequent updating of addresses for up to 6 years; still, the receipt and handling of these patients' claims could not be assessed. However, it is remarkable that the administrators were unable to locate any records for 64% of the 50 filed claims and that 28% still had not been resolved after 2–6 years. All claims had been contested initially. The severity of asbestos-related disease in this group of patients was comparable to that seen among the patients who had filed only with the State Fund, but in contrast, 89% of the State Fund claims had been resolved, with the majority having been accepted without compromise. Therefore, a substantial proportion of the Longshore claimants were probably denied compensation unjustifiably. Given the current policy of the State Fund to accept valid asbestos-related disease claims provisionally until jurisdictional conflicts are resolved, it is likely that costs for compensation are being shifted unfairly to the State Fund. The handling of workers' compensation claims for occupational disease under the Longshore system should be scrutinized closely by regulators and future investigators.

This study also revealed unexpectedly that the likelihood of acceptance of a State Fund claim for asbestos-related disease may be related to the claimant's race. This observation appeared to be mediated at least partially by jurisdictional conflicts, although it was independent of all other available variables that were potentially related to claim acceptance or rejection, and it persisted after statistical adjustment for the effects of jurisdictional conflict. The finding of an association between race and claim outcome should be interpreted cautiously. The observed association could have indirectly reflected the effect of differences between races in parameters for which no information was available, such as the presence or absence of legal representation; or it could have reflected racial differences in some measured disease-associated parameter that had mediating effects not otherwise detectable because the number of nonwhite patients in the analysis was small. Alternatively, the limited statistical power provided by the small study sample may not have fully represented the strength or statistical significance of a true association between race and claim outcome after adjustment for jurisdiction effect. No conclusive determination can be made on the basis of the available data regarding the influence of race on claim outcome, but the association warrants further evaluation.

Interestingly, the likelihood of State Fund claim acceptance among the overall group of patients showed no relationship to the severity of asbestos disease, as judged by chest roentgenographic criteria. Pulmonary function tests also showed no statistically significant association with claim outcome, although the trend toward lower prevalence of restrictive dysfunction and low diffusion capacity among patients with rejected claims would be consistent with an explanation that patients with radiographic evidence of asbestos-related pleural or pulmonary interstitial changes but with no associated physiologic impairment are more likely to have their claims rejected. Such a policy would be a tenable rationale for determination of eligibility for disability compensation. However, existence of such a policy could deny workers' compensation coverage for the costs of evaluating physical abnormalities truly attributable to occupational factors and would inappropriately shift responsibility for such coverage to other insurance sources or to the individual. It is also plausible in some jurisdictions that, if physiologic impairment subsequently manifested more clearly, the claimant's ability to have accepted a claim re-filed later for the same

diagnosis might be jeopardized if the time since original diagnosis exceeded an applicable statute of limitations.

It can be extremely difficult to determine the relative contributions to impairment from coexistent asbestosis and tobacco-related chronic obstructive pulmonary disease (COPD), but State Fund claim acceptance was unaffected by smoking history or the presence or degree of COPD in this group. The association between job type and claim outcome probably was primarily attributable to effects of jurisdictional conflict, since the decision to file a patient's claim under single or multiple jurisdictions was a direct consequence of whether the patient had been exposed to asbestos in a shipyard, a nonshipyard industry, or both.

The findings that a significant proportion of asbestos-related disease claims filed under the federal and the state compensation systems were rejected for individuals with objective findings of disease is consistent with the few other studies that have examined this issue [Selikoff and Spatz, 1981; Johnson and Heler, 1983; Siskind, 1987]. As a prototype for workers' compensation for chronic occupational diseases in general, these findings support earlier reports indicating that occupational diseases relative to injuries are under-compensated [Barth, 1981]. Moreover, it has been noted that one of the constraints of optimal participation of health care providers in the care of occupational health problems is the concomitant involvement in the workers' compensation system [Committee . . . , 1988]. Our findings provide support for the common perception among health providers that the adjudication of occupational disease claims is impacted by undefined factors other than the presence, severity, or work-relatedness of disease.

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