Frequency of Occupational Health Concerns in General Clinics

Philip Harber, MD, MPH
Michael Mullin, BS
Brenda Merz, MPH
Mahshid Tarazi, BA

Studies have suggested that occupational disease and injury are under-recognized by clinicians. To estimate the frequency of occupational factors in disease and injury, 108 patients in a general (not occupational) health care facility were interviewed about the frequency and types of workplace–health interactions. Thirty-nine percent reported possible causation by work, and 66% reported a possible increase in symptoms by work, even if not caused by work. Twenty-seven percent reported changing jobs and/or tasks because of work–health interactions. The majority of men and women reported that worksite changes could improve their functional ability at work. This study therefore indicates that (1) occupational health concerns are common in primary care clinics, even if not addressed by clinicians; (2) the definition of occupational health concerns should be broadened to include disease caused by work, disease symptoms worsened by work, and the need for occupational accommodation even if the disease itself is not caused by work; and (3) inquiring about patient concerns about workplace–health interactions can provide clinicians with significant opportunities for primary, secondary, and tertiary prevention. (J Occup Environ Med. *2001;43:939–945*)

Recognition of occupational medical problems is important for the individual patient and from a public health perspective, yet such problems often are overlooked. This can deprive patients and their coworkers of the benefit of preventive interventions.

Several approaches have been used to identify the occupational health aspects of problems in individual cases and to assess their overall impact on public health. Specialized occupational health clinics have been implemented in private, academic,[1,2] union,[1,2] and government-sponsored settings. Increased training of specialists, and increased education of generalists, regarding occupational medicine have been suggested. Systematic public health surveillance methods include aggregation of clinicians' reports of occupational illness (eg, filed for workers' compensation insurance purposes)[3] or reporting by selected clinicians in community settings (eg, used in several of the US SENSOR projects).[4] However, these methods are limited by their reliance on recognition and reporting by physicians. Furthermore, they focus on enumeration of diseases caused by work and, therefore, do not regularly consider other interactions with work (eg, work exacerbating preexisting disease, functional limitations of non-occupational disease that interfere with work).

Because most systematic surveillance studies are based on cases reported to be occupational in origin or on surveys of groups with high a priori likelihood of occupational dis-

From the University of California, Los Angeles, Occupational and Environmental Medicine.

Supported by Contract U60/CCU912006-05 from the National Institute for Occupational Safety and Health/Centers for Disease Control.

Address correspondence to: Dr Philip Harber, UCLA Occupational and Environmental Medicine, 10940 Wilshire Boulevard, Suite 1220, Los Angeles, CA 90024; pharber@mednet.ucla.edu.

ease, the actual frequency of occupational disorders in general clinical settings is uncertain. The extent of the need for occupational medical expertise on the part of occupational medicine specialists and primary care clinicians requires quantification of the frequency of issues relevant to occupational health. This article describes a study of the frequency of occupational health concerns expressed among patients in general medical clinics.

Methods

The Occupational Respiratory Disease Evaluation and Rehabilitation System (ORDERS) project provides computer-assisted advice to clinicians and patients about the occupational aspects of respiratory disease.[5] Potential subjects have preliminary interviews to identify those with possible concerns about respiratory–workplace interactions. This report is based on those individuals who did not have respiratory problems. The latter group was excluded from this analysis because their subsequent data collection was of greater depth; therefore, their results are not directly comparable. There was no a priori reason, however, to believe that results for subjects with respiratory disease would be fundamentally different in any fashion.

Individuals waiting for medical care in several Los Angeles area clinical facilities participated. The participating sites included clinics in county hospital–affiliated ambulatory care settings, a managed care clinic network focusing on primary care, and ambulatory clinics at a county hospital. In each setting, the physicians responsible for the care of the patients provided permission to approach the patients. The "script" for approaching patients was reviewed by the institutional review boards. Patients, while in the waiting areas, were approached and asked a few preliminary questions to determine eligibility for the more in-depth ORDERS project. Potential subjects were informed of the option not to be interviewed in this eligibility-screening component.

Questions were posed orally, and the responses were recorded by the interviewer. For most questions, subjects chose from a specific set of responses; in other cases, more open-ended questions were permitted (eg, job title). Information that would permit identifying a specific subject was not collected because the data were derived from interviews before obtaining full consent. Examples of the primary questions included:

- Within the past 5 years, have you changed the company where you work or your job title because of any health problem?
- In the past 5 years, have you changed the kinds of things you do at work on a permanent basis because of your problem?
- What part of your health problem most affects you when you work?
- Do you think something at work may possibly have caused your problem?
- Do you think something at work may make your problem worse, even if it did not cause it?
- Sometimes, a medical problem can make it difficult to work. If something could be changed at work to make it easier for people with medical conditions such as yours, what do you think it is?

For purposes of analysis, the occupational (job) categories were aggregated into several groupings: "high-service" occupations included those for which at least 1 year of education is typically requisite (eg, professionals, bookkeepers). "Low-service" occupations included service-related occupations that typically require less than 1 year of formal training (eg, hotel maid, sales clerk, nurse's aide). "Transportation" included workers in transportation jobs such as railroad or trucking operatives, and "fabrication" included construction and manufacturing workers.

Clinical problems were grouped into several categories: internal medicine, eye, musculoskeletal, dermatologic, and other. Each subject's response to the question about his or her main health problem was recorded, and the responses were categorized post facto. A similar method was used to categorize responses to the questions about the aspect of health that most limited work ability and the responses about what might be done at work to improve one's ability to work.

Results

Results reported here are based on the first 108 subjects, of whom 71 were male; 49 were interviewed in Spanish (after pilot testing of the translated interview instrument). The ambulatory care managed care network contributed 46 subjects, and 62 came from the county hospital-affiliated ambulatory clinics.

Initial analysis focused on work-relatedness, for which two types were assessed: caused by work and made worse by work. Subjects were encouraged to provide affirmative responses if they thought there was a "reasonable possibility" of work-relatedness. Analyses were conducted overall and were stratified by gender and occupational category. As shown in Table 1, 39% thought their illness was possibly caused by work.

The proportion of subjects who reported that their health condition was *worsened* by work was greater than the proportion who thought their illness was possibly *caused* by work (66% and 39%, respectively, Table 1). As shown in Table 2, the work factors associated with the effect differed between the "caused by" and "worsened by" categories. In particular, stress generally was considered to affect (worsen) rather than cause illness, whereas the opposite relationship was found for injuries. Men reported more frequently than women that work *caused* their problem (48% vs 22%, $P < 0.01$), whereas the proportion who thought their problem was worsened by work was similar among men and women. Although there was a tendency for workers in the manufacturing job

TABLE 1
Effect of Work on Illness, by Gender

	Male		Female		Total	
	n	%	*n*	%	*n*	%
Possibly caused by work*						
No	37	52	29	78	66	61
Yes	34	48	8	22	42	39
Possibly worsened by work†						
No	23	32	14	38	37	34
Yes	48	68	23	62	71	66

* $\chi^2 = 7.06$, $P < 0.01$.
† $\chi^2 = 0.3$, not significant.

TABLE 2
Type of Work Effect

	Possibly Caused by Work*						Possibly Worsened by Work†					
	Male		Female		Total		Male		Female		Total	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
None	37	52	29	78	66	61	23	32	14	37	37	34
Chemicals	11	16	2	5	13	12	11	15	3	8	14	13
Work demand	4	6	0		4	4	11	15	2	5	13	12
Injury	11	16	0		11	10	4	6	1	3	5	5
Repetitive actions	6	8	4	11	10	9	9	13	5	14	14	13
Stress	1	1	1	3	2	2	7	10	8	22	15	14
Other	1	1	1	3	2	2	6	9	4	11	10	9

* $\chi^2 = 13.1$, $P < 0.04$.
† $\chi^2 = 6.3$, not significant.

TABLE 3
Work Relationship by Occupational Category

	No		Yes	
	n	%	*n*	%
Possibly caused by work*				
Low-service	34	61	22	39
High-service	16	80	4	20
Transportation	6	60	44	40
Manufacturing	7	39	11	61
Professional	3	75	1	25
Possibly worsened by work†				
Low-service	21	38	35	62
High-service	5	25	15	75
Transportation	4	40	6	60
Manufacturing	6	33	12	67
Professional	1	25	3	75

* $\chi^2 = 7.1$, not significant.
† $\chi^2 = 1.3$, not significant.

category to report an occupational component as causing their illness, the results were not statistically significant (Table 3).

Health problems had significant effects on work. Table 4 shows that 13% of these non-selected subjects reported changing jobs because of health problems, and 18% modified what they do at work because of health. Only 4% indicated that they both changed jobs and modified tasks, suggesting that the subjects could differentiate these choices well.

Table 5 summarizes the subjects' responses to questions about how their illness impairs work ability. A

TABLE 4
Effect of Health Problem on Work*

	Change Tasks at Work					
	No		Yes		Total	
	n	%	*n*	%	*n*	%
Change Jobs						
No	76	73	15	14	91	87
Yes	10	9	4	4	14	13
Total	86	82	19	18		

* All subjects who changed jobs or tasks at work.

variety of effects occurred, and the type of limitation varied according to the subjects' health problem. Notably, very few (less than 30% overall) reported no effect from their illness on their work ability. As expected, persons with musculoskeletal disorders reported the most frequent effects as being pain and limited range of motion. Internal medicine patients reported an impact of illness on several occupational capacities.

Subjects were also asked if changes in the workplace could improve their ability to work. Approximately 60% (59 of 101 patients) reported that worksite changes would be potentially beneficial in improving functional status. Details are shown in Tables 6 and 7. Several types of improvements were considered to be potentially useful. These included change in work demands (workload) (18%), differences in work organization such as hours (10%), and environmental controls such as chemical changes and personal protective devices (29%).

Opportunities for beneficial intervention were thought by the subjects to differ depending on job category. Overall, high-service persons were most likely to report a possibility of improvement. The types of intervention considered possibly useful differed among job categories. High-service/professional workers emphasized administrative controls, whereas low-service and manufacturing workers reported that workplace environmental controls and adjustment of physical job demands were more likely to be helpful. Table 7 shows worksite modification stratified by health problems among this population.

Discussion

This study demonstrates that occupational health concerns are very frequent in general clinical settings. Furthermore, although occupational medicine has traditionally focused on identifying disease that is *caused by* work, the more frequent interaction is that work may *worsen* disease that preexists. There are many opportunities for interventions to improve the functional status regarding work. Sixty percent of subjects reported that changes at the worksite could improve their ability to work (Table 6).

Implications for Clinical Occupational Health

These data underscore the need for occupational health expertise in general clinical settings to understand the causes of disease and, more frequently, the impact of the work environment on worsening a non-occupational disease or its workplace functional impact. Understanding workplace factors requires knowledge of the worksite, including familiarity with chemicals, processes, and physical demands. In addition to knowledge per se, addressing these concerns requires the attitude that worksite concerns are clinically relevant.[6,7]

Other investigators have also demonstrated that occupational health concerns are frequent in general medical settings. For example, Thompson et al[6] used a short questionnaire and found that 23% of patients had concerns about possible job-related health problems. Our findings of 40% of patients who reported possible "work-caused" disease are consistent with their results because their questionnaire emphasized specific exposures. In addition, those researchers focused on job-caused health problems rather than the broader definition of work–health interactions used in the current study. In an Iowa primary-care clinic, 75% of patients reported at least one potentially toxic exposure.[8] In a union-based primary general health care clinic in New York, 64% of workers reported possible occupation-caused illness or injury.[9]

An extensive survey of 53,000 adults demonstrated that over 10% of those of working age (18 to 64 years) reported a "limitation in the ability to work at a job or business"[10]; thus, these problems are quite frequent. The methods for improving work functional status depend on the job category. Workplace environment controls, such as chemical exposure modification, seemed particularly relevant in the low-service and fabrication sectors, whereas changes in work organization were more frequently relevant to high-service workers. Hence, the needs of the individual must be carefully assessed on a case-by-case basis. Even "clean jobs" warrant attention.

Unfortunately, many clinicians currently use a narrow definition of health, focusing on the treatment of clinical manifestations of the disease process itself and disregarding disease potentially worsened by (but not caused by) work or workplace changes that might improve functional status. The impact of non-occupational disease on work ability is common, as shown in this study and others. Occupational medicine specialists and educators also focused on "work-caused" disease; a recent Delphi analysis to determine core competencies showed that European occupational health educators "had traditional disease focused views of the competencies acquired. . . and are lagging behind the evolving definition of occupational health."[11]

Several studies have shown that occupational health issues are not adequately addressed in non-specialty clinics. Physicians often do not "ask the right questions," even in likely occupational cases. Milton et al[12] found occupationally relevant

TABLE 5
Impact of Illness on Work: Work-Limiting Factors by Health Problem Category*

	Main Problem									
	Internal Medicine		Eye		Musculo-skeletal		Dermato-logic		Misc	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%
Limiting factors at work										
No effect	5	23	2	40	9	20	4	44	10	43
Concentration	2	9	1	20	2	4	0		5	22
Pain	3	14	0		13	29	0		1	4
Motion	0		0		10	23	0		2	9
Skin	0		0		0		5	56	0	
Dyspnea†	2	9	0		0		0		1	4
Fatigue	9	41	0		9	20	0		4	18
Other	1	4	2	40	2	4	0		0	

* Based on all subjects except those seeking care for pregnancy. Percentages are based on columns. $\chi^2 = 95$, $P = 0.001$.
† Respiratory patients were excluded from this study.

TABLE 6
Modification of Worksite for Functional Improvement, by Job Type* and Gender†

	High-Service		Low-Service		Con-struction		Trans-portation		Male		Female	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
Possible Methods of Improvement												
None	7	31	23	45	7	41	5	50	26	39	16	47
Control environment	4	17	17	33	8	47	0		24	36	5	15
Work demands	6	26	6	12	2	12	5	50	12	18	7	20
Organizational structure	6	26	5	10	0		0		5	7	6	18

* $\chi^2 = 22.7$, $P < 0.01$.
† $\chi^2 = 6.1$, not significant.

TABLE 7
Modification of Worksite for Functional Improvement, by Health Problem*

	Internal Medicine		Eye		Musculo-skeletal		Dermato-logic		Misc	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%
Possible Methods of Improvement										
None	12	60	2	40	14	31	3	33	11	55
Control environment	2	10	3	60	13	30	6	67	4	20
Work demands	3	15	0		13	30	0		13	30
Organizational structure	3	15	0		4	9	0		3	15

* $\chi^2 = 22$, $P < 0.04$.

questions in only 10 of 67 medical records of patients deemed as likely candidates for occupational asthma (selected from a Health Maintenance Organization population of 79,000). Primary and urgent care physicians asked relevant questions in only 7% of likely cases. Medical training includes little occupational medicine.[13,14] Students often think this area is of very low relevance to mainstream medical practice.[13,14] Our recent survey[7] showed that clinicians thought addressing occupational health concerns was constrained by inadequate knowledge and time. Therefore, both time and expertise must be made available in view of the high frequency of work-relevant issues in general clinical settings.

Surveillance and Public Health Implications

The public health perspective should assess the overall impact of work on health and ascertain programmatic needs for improving health. There are three major implications: (1) Systematic data collection from general clinics can signifi-

cantly augment existing surveillance systems. (2) A broader definition is needed to understand the impact of work on health. (3) Planning for programmatic needs should consider the adequacy of resources for the secondary prevention of disability.

The data from this study show that surveillance based solely on counting cases reported as "caused by" work from traditional sources such as doctors' first report (workers' compensation) forms will significantly underestimate the impact of work. Many individuals in this study reported that their illness was caused by work (39%), yet few, if any, of these reports would have been ascertained by usual surveillance methods. Indeed, it is uncertain whether the subjects would have reported their concerns to the clinicians. Several studies have demonstrated that a high proportion of individuals with work-caused disease were not in the workers' compensation system.[15] Therefore, surveillance systems for occupational disease and injury may benefit from systematically querying patients and workers in primary care settings. At the very least, such an approach would help estimate the degree of under-ascertainment by reliance on workers' compensation data. This concept is implicit in many epidemiologic studies of occupational cancers: data are collected from cases and controls identified in routine health care settings rather than relying on physician identification of occupational causation.

Furthermore, the range of effects traditionally determined is much narrower than the actual scope of workplace–health interactions. More persons reported that their health was "worsened" by their work than that the work was the "cause" of their illness (66% vs 39% overall). The high frequency of changing jobs (13%) and modifying work (18%) demonstrates that routine surveillance systems are likely to underestimate the impact of work–health interactions. Health professional resources and payment mechanisms must be developed to deal with these needs.

Health Systems Implications

Occupational medicine exists within a broader health care system. This study strongly suggests that occupational health must be integrated into the primary health care systems. The total separation of *work-caused* and *non-work-caused* care is counterproductive and arbitrary.

The data also support the development of integrated disability management programs. These programs are predicated on the concept that methods for limiting disability (functional impact) due to illness are largely the same for problems caused by work (eg, managed under workers' compensation systems) and those not caused by work (managed under group health care).

In the United States, significant administrative barriers to integrated disability management programs have been imposed by the separation of workers' compensation, group health, and short-term disability insurance programs. Nevertheless, some large corporations and several insurers are now providing effective integrated disability management programs. The frequency of reporting possible improvement in workplace functional status was high among these subjects. In addition, the general types of interventions were comparable. Thus, a consistent, integrated approach is preferable. Furthermore, emphasizing workplace accommodation efforts only for those patients covered under workers' compensation may discourage such attention in other cases. This is particularly important because workplace modification was thought to be potentially helpful by many subjects with diseases not caused by work.

Despite the benefits of bringing occupational medicine into general clinical settings, there are major constraints. In the past, occupational medicine was frequently viewed as distant from the mainstream of medicine. For example, in the United States, separate payment mechanisms existed (workers' compensation vs group health insurance), and much care for occupational illness was provided by clinicians with a primary focus in this area (whether trained in occupational medicine per se or as an organ system specialist whose practice emphasizes occupational injury). Medical students viewed this area as being of little relevance to mainstream medical practice.[16]

There are too few well-trained occupational medicine clinicians (eg, residency-trained or board-certified in occupational medicine).[17] Furthermore, physicians in other specialties receive very little training in occupational medicine. Curricular time for occupational-environmental medicine in medical schools is inadequate and has not been increasing.[18,19] In addition, relatively few of the fully trained specialists are available on a consultative basis in clinical settings; in 1990, Pransky estimated that only 650 were available.[20]

The training of specialists in occupational medicine continues to be inadequate. There is a shortage of professionals practicing occupational health. Only 3000 physicians have become board-certified in occupational medicine in United States since 1955.[21] Particularly in the United States, only a relatively small proportion of physicians practicing in this area are fully trained/board-certified. Recent data suggest that there are 2161 board-certified physicians in occupational health, or 35% of the physicians practicing in this area. According to the recent Institute of Medicine Report,[22] only 20% of the members of the American College of Occupational and Environmental Medicine are board-certified, although 75% spend over 90% of their time practicing this field. In the United States, only 16,000 physicians practice in this area, and only about 1500 are specialists.[23] It is likely that many nursing personnel in the work setting also

are not formally trained in occupational health nursing.

Conclusions

This study leads to several conclusions. First, occupational health concerns are very frequent, and the frequency is underestimated by most surveillance systems and workers' compensation data sets. Second, the definition of work-related health condition should be broadened to include the full range of work–health interactions rather than just disease and injury proximately caused by work. For example, the impact of illness on work ability is a valid consideration. Third, clinical and worksite methods to improve work functional status represent significant opportunities for prevention. Fourth, systems for delivery of occupational health services should be modified so that occupational health may be better integrated into primary care settings.

References

1. Wheeler S, Rosenstock L, Barnhart S. A case series of 71 patients referred to a hospital-based occupational and environmental medicine clinic for occupational asthma. *West J Med*. 1998;168:98–104.
2. Rosenstock L, Daniell W, Barnhart S, et al. The 10-year experience of an academically affiliated occupational and environmental medicine clinic. *West J Med*. 1992;157:425–429.
3. Reinisch F, Harrison RJ, Cussler S, et al. Physician reports of work-related asthma in California, 1993–1996. *Am J Ind Med*. 2001;39:72–83.
4. Jajosky RA, Harrison R, Reinisch F, et al. Surveillance of work-related asthma in selected US states using surveillance guidelines for state health departments—California, Massachusetts, Michigan, and New Jersey, 1993–1995. *MMWR Morb Mortal Wkly Rep*. 1999;48:1–20. CDC Surveillance Summary.
5. Harber P, Merz B, Lam I, et al. Intelligent database generated occupational questionnaire system. *J Occup Environ Med*. 2000;42:483–490.
6. Thompson JN, Brodkin CA, Kyes K, Neighbor W, Evanoff B. Use of a questionnaire to improve occupational and environmental history taking in primary care physicians. *J Occup Environ Med*. 2000;42:1188–1194.
7. Harber P, Merz B. Time and knowledge barriers to recognizing occupational disease. *J Occup Environ Med*. 2001;43:285–288.
8. Schwartz DA, Wakefield DS, Fieselmann JF, Berger-Wesley M, Zeitler R. The occupational history in the primary care setting. *Am J Med*. 1991;90:315–319.
9. Herbert R, Plattus B, Kellogg L, et al. The Union Health Center: a working model of clinical care linked to preventive occupational health services. *Am J Ind Med*. 1997;31:263–273.
10. Macdonald EB, Ritchie KA, Murray KJ, Gilmour WH. Requirements for occupational medicine training in Europe: a Delphi study. *Occup Environ Med*. 2000;57:98–105.
11. McNeil J. Prevalence of disabilities and associated health conditions among adults—United States, 1999. *MMWR Morb Mortal Wkly Rep*. 2001;50:120–125.
12. Milton DK, Solomon GM, Rosiello RA, Herrick RF. Risk and incidence of asthma attributable to occupational exposure among HMO members. *Am J Ind Med*. 1998;33:1–10.
13. Hegmann K, Barrier P, Moser R. Occupational medicine training program surveys. *J Occup Med*. 1993;35:768–775.
14. Castorina JS, Rosenstock L. Physician shortage in occupational and environmental medicine. *Ann Intern Med*. 1990;113:983–986.
15. Blanc P. Occupational asthma in a national disability survey. *Chest*. 1987;92:613–617.
16. Sokas RK, Fenton B, Foran J, et al. Environmental medicine: its introduction into a medical school primary care requirement. *Med Educ*. 1993;27:410–415.
17. Lane DS. A threat to the public health workforce: evidence from trends in preventive medicine certification and training. *Am J Prev Med*. 2000;18:87–96.
18. Burstein JM, Levy BS. The teaching of occupational health in US medical schools: little improvement in 9 years. *Am J Public Health*. 1994;84:846–849.
19. Schenk M, Popp SM, Neale AV, Demers RY. Environmental medicine content in medical school curricula. *Acad Med*. 1996;71:499–501.
20. Pransky G. Occupational medicine specialists in the United States: a survey. *J Occup Med*. 1990;32:985–988.
21. American Board of Preventive Medicine. ABPM certificates issued 1949 to 2001. Available at: http://www.abprevmed.org/html/statistics.html. Accessed March 26, 2001.
22. Committee to Assess Training Needs for Occupational Safety and Health Personnel in the United States, Board of Health Sciences Policy, Institute of Medicine. *Safe Work in the 21st Century: Education and Training Needs for the Next Decade's Occupational Safety and Health Personnel*. xxi. Washington, DC: National Academy Press; 2000.
23. Long A. Training and education. In: Herzstein JA, Bunn WB, Fleming LE, Harrington JM, Jeyaratnam J, Gardner IR, eds. *International Occupational and Environmental Medicine*. St. Louis, MO: Mosby; 1998:172-177.