

SENSOR Occupational Lung Disease Bulletin

A project of the Massachusetts Department of Public Health's Occupational Health Surveillance Program, the Massachusetts Thoracic Society, and the Massachusetts Allergy Society

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Since 1992, Massachusetts and three other states (California, Michigan and New Jersey) have conducted state-based surveillance and intervention programs for work-related asthma (WRA) as part of the SENSOR program funded by NIOSH. Data collected by these states over a 3 year period were summarized in an article recently published in CDC's *Morbidity and Mortality Weekly Report* (MMWR). In this issue of the Bulletin, key findings from that report are presented.

Surveillance of Work-Related Asthma in Four U.S. States, 1993-1995

(Adapted from "Surveillance of Work-Related Asthma in Selected U.S. States Using Surveillance Guidelines for State Health Departments - California, Massachusetts, Michigan, and New Jersey, 1993-1995", by Ruth Ann Jajosky, et.al. in CDC Surveillance Summaries, MMWR, June 25, 1999)

Case Identification and Follow-Up

The primary data source for all four states is physician reports. All four states have mandatory physician reporting of occupational diseases, including work-related asthma (WRA). Physician case reports are actively solicited in Massachusetts, Michigan, and New Jersey. California has a passive surveillance system based on Doctor's First Reports (DFRs) of Occupational Injury or Illness - a long-standing, statewide physician reporting system directly linked to physician reimbursement of medical services. Surveillance staff administer follow-up questionnaires to patients with suspected WRA to collect information about their reported conditions (e.g., the association with workplace exposures and the industry and occupation of the affected person). Surveillance findings are used to direct intervention and prevention activities towards individual workers, physicians, unions and potentially hazardous workplaces. In Michigan and New Jersey, medical records are routinely reviewed for objective physiologic findings to substantiate a WRA diagnosis.

Case Classification

WRA surveillance case definitions require a health care professional's diagnosis of asthma and an association between symptoms of asthma and work. WRA cases are classified to distinguish between work-related exacerbations of a pre-existing asthma condition (work-aggravated asthma) and asthma induced by workplace exposures (new-onset asthma). The WRA classification system distinguishes between two types of new-onset asthma. - reactive airways dysfunction syndrome (RADS) (i.e., persistent asthma symptoms induced by a one-time, high-level irritant exposure) and occupational asthma (i.e., classic sensitizer-induced asthma and irritant-induced asthma not meeting the RADS criterion).

Results

From 1993 through 1995, a total of 1,101 cases of WRA were identified by SENSOR surveillance staff in California, Massachusetts, Michigan, and New Jersey. Of these 1,101 cases, 19.1% were classified as work-aggravated asthma, and 80.9% were classified as new-onset asthma. Overall, 123 cases (11.2%) were classified as RADS and 768 cases (69.8%) as occupational asthma. Only 29 case-patients in Michigan and New Jersey (5.2% of the 562 case-patients in these two states) had medical record documentation of pulmonary function testing performed in relationship to work. Of these, 19 of 29 case-patients (65.5%) had medical record documentation of pulmonary function testing that substantiated work-relatedness.

Table 1. Ten most frequently reported putative agents associated with cases of work-related asthma, both new-onset and work-aggravated - California, Massachusetts, Michigan, and New Jersey SENSOR programs, 1992-1995

Agent*	New-Onset Asthma		Work-Aggravated Asthma		Total	
	No.	%	No.	%	No.	%
Air pollutants, indoor	67	7.5	19	9.0	86	7.8
Mineral and Inorganic Dust, NOS**	45	5.1	34	16.2	79	7.2
Chemicals, NOS	56	6.3	17	8.1	73	6.6
Lubricants, NOS	55	6.2	2	1.0	57	5.2
Cleaning Materials, NOS	42	4.7	9	4.3	51	4.6
Smoke, NOS	40	4.5	10	4.8	50	4.5
Solvents, NOS	36	4.0	7	3.3	43	3.9
Toluene diisocyanate	41	4.6	-	0.0	41	3.7
Welding fumes, stainless steel	31	3.5	6	2.9	37	3.4
Diisocyanates, NOS	34	3.8	2	1.0	36	3.3

* Agents are coded according to the Association of Occupational and Environmental Clinics' (AOEC) exposure coding scheme.

** Not otherwise specified.

REPORT APRIL-JUNE CASES NOW

By July 31st, report all occupational lung disease cases seen for the first time between April and June, 1999. If you have NOT seen any cases, it is not necessary to return the report form.

Indoor air pollutants, dusts, cleaning materials, lubricants (e.g., metalworking fluids), and diisocyanates were among the most

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frequently reported causes of WRA (see Table 1). In addition, SENSOR data played an important role in identifying a well-known cause of occupational asthma - natural rubber latex- in a new work setting, the healthcare industry.

Manufacturing industries and service industries were associated with 41.5% and 31.2% of cases respectively. Manufacturing was the most frequently reported industrial sector cited in Michigan and New Jersey. Transportation equipment manufacturing, the predominant manufacturing industry reported in Michigan, was associated with 43.5% of WRA cases in that state. In California and Massachusetts, service industries were associated with 40.5% and 51.3% of cases respectively. Health services topped the list of service industries in Massachusetts, and health and educational services were associated with 14.6% and 14.4% respectively of cases in California.

The occupational category of operators, fabricators, and laborers was associated with the highest percentage of WRA cases overall (356 cases, 32.3%). The largest number of cases came from Michigan, with 55.4% of state cases coded to this category. The most frequently reported categories associated with WRA in the other three states included technical, sales, and administrative occupations in California (32.1% of cases); managerial and professional specialty occupations in Massachusetts (30.1% of cases); and both the managerial and professional specialty occupations and the operators, fabricators, and laborers category in New Jersey (23.3% of cases in both categories).

Discussion

Estimates of the proportion of asthma in the adult U.S. population that is work-related range from 2% to 26%. Public health surveillance systems for WRA are needed to effectively plan and implement public health intervention programs through the identification of specific industries, workplaces, and exposures.

More than 250 agents are known to cause WRA. The surveillance findings point to well-recognized causes of asthma (e.g., diisocyanates, latex, glutaraldehyde and epoxy resins) and provide evidence that other less-recognized causes (e.g., cleaning agents and metal working fluids) are also associated with WRA.

Cleaning agents, which can contain strong respiratory irritants (e.g., chlorine, ammonia) or sensitizers (e.g., benzalkonium chloride, chloramine, chlorhexidine, formaldehyde), were frequently reported as putative agents associated with WRA. A total of 62 WRA cases were associated with agents coded as cleaning materials, including, for example, household cleaners, soaps/detergents, and metal polish. Of these 62 cases, 51 were classified as new-onset asthma and 11 as work-aggravated asthma. Additional WRA cases were reported to be associated with cleaning-related processes, including some with putative agents coded as solvents, NOS (e.g., used in graffiti removal), ammonia solution, and bleach. Some of the reported cleaning agent cases involved improper mixing of products or chemicals. These findings suggest the need for enhanced health communications concerning the risks associated with various cleaning materials, as well as the need to target industries and workers at high risk.

Indoor air pollutants were reported as a cause of new-onset and work-aggravated WRA in all four states and represented the most frequent putative cause for WRA cases overall. The types of exposures reported in association with indoor air pollutants included poor ventilation, pesticides, dusts and dirt, molds,

environmental tobacco smoke, paint odors, and other nonspecific building odors. Affected workers included teachers, nurses, secretaries, librarians, computer operators and programmers, technicians, clerks and office workers.

One overall limitation of the SENSOR WRA program is that the data represent an underestimate of the true number of WRA cases because of the under-recognition of asthma work-relatedness and the underreporting of recognized cases. The extent of underreporting varies by state, in part, because of differences in sources used to identify cases. In Massachusetts, physicians were the sole identification source, and a limited number of clinics and physicians reported WRA cases. Although industries and occupations that contribute to WRA were identified, the data are not considered representative or an indicator of the magnitude of WRA in Massachusetts. In California, cases were identified through an administrative system that requires physicians to submit DFRs when seeking reimbursement from workers' compensation insurers. Thus, these data are considered more representative because all types of physicians throughout the state use this mechanism.

SENSOR data indicate that WRA cases commonly lack confirmatory pulmonary function data, an apparent reflection of usual medical practice. Pulmonary function testing plays two major roles in the diagnosis of WRA -confirming the presence of asthma and documenting work-relatedness.

The data collection methods pioneered by the state-based SENSOR WRA programs have many strengths. Data standardization has allowed for aggregation of meaningful data across the participating states. This allows conclusions to be made regarding the nature and extent of WRA in the U.S., which allows public health prevention programs to be developed and guided nationwide. In addition, surveillance systems based on physician reporting provide a vehicle for educational outreach to physicians on asthma work-relatedness. This is important because physicians are critical to WRA prevention. The SENSOR WRA programs also provide a mechanism for workers and physicians to request workplace investigations aimed at primary prevention.

NIOSH and state health department representatives are working to establish a long-term agenda for state-based surveillance of work-related conditions and hazards, including identification of priority conditions for surveillance at the state level. The results from the SENSOR WRA programs described in this report support inclusion of WRA in such a priority condition list and suggest that programs directed at adult asthma should address WRA.

Number of Work-Related Asthma Cases Reported to Massachusetts SENSOR, March 1992- March 1999

January 1999	February 1999	March 1999	Total to Date (3/92-3/99)
4	3	5	643