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

Massachusetts Department of Public Health, Occupational Health Surveillance Program
250 Washington Street, 6th floor, Boston, MA 02108 Tel: (617) 624-5632 Fax: (617) 624-5696

March 2001

Silicosis

Healthy People 2000, the US Department of Health and Human Services public health goals, listed silicosis as one of the preventable occupational lung diseases that could be eliminated by the year 2000. This goal was not accomplished. The Occupational Health Surveillance Program received two recent reports involving illness associated with silica exposure. Last August, a physician reported a case of silicosis in a 45-year-old Massachusetts dental technician who worked in his own dental laboratory. In February, OHSP received an inquiry about a Maine worker diagnosed by video assisted open lung biopsy with aluminum silicate particles in her lungs; she had previously worked in antiperspirant manufacture. Silica exposure continues today in sandblasting, construction projects (including the Big Dig and road repair) and in dental laboratories. Continued health care provider vigilance is required to diagnose this "old" occupational disease. This report provides an update about silicosis.

Epidemiology

Over the last 20 years, new cases of silicosis have been diagnosed; silicosis has continued to claim lives. In the United States, most silicosis-associated deaths occur among persons aged 65 years and older. Active surveillance is only conducted in several states that receive NIOSH funding. Four states (Michigan, New Jersey, Ohio and Wisconsin) conducted active surveillance of silicosis using death certificates, hospital discharge data and physician reports between 1987-1990; they documented 430 cases over this period (MMWR November 19, 1993/42(SS-05);23-8).

Silicosis affects young workers as well. The Association of Occupational and Environmental Clinics, a national network with 53 clinical facilities reported 158 cases, among whom 68 are under 65 years of age. Estimates of the prevalence of silicosis in the United States vary, ranging from 30,000 to 100,000 current cases.

REPORT NOV. 2000-FEB. 2001 CASES NOW
By March 31st, report all occupational lung disease cases seen for the first time between November 2000 and February 2001. If you have NOT seen any cases, it is not necessary to return the report form.

Unlike asbestosis deaths, which continue to climb, the number of deaths attributed to silicosis has dropped from over 1000 in 1970 to 212 in 1996 (NIOSH Worker Health Chartbook, 2000), reflecting a decline in the dusty trades and/or reduced recognition of silicosis. NIOSH Division of Respiratory Disease published a report about deaths from progressive massive fibrosis (PMF) of two young (ages 36 and 30) sandblasters caused by intense silica exposure. This report analyzed data of silicosis-associated deaths from 1968-1994 (n=14,824) and found that 22.7% of the deaths occurred among persons aged 45-64 years and 1.4% among persons 15-44 years. Among the young silicosis decedents, 57% were white, and 91% were male (MMWR May 1, 1998 47(16);331-335).

Exposure

The US Department of Labor estimated (1996) that one million workers are exposed to silica. Some of the industries of concern are found in the table below:

Construction (sand-blasting, rock drilling, masonry work, jack hammering, tunneling)	Agriculture (dusty conditions from disturbing the soil, such as plowing)
Foundry work (grinding, moldings, shakeout, core room)	Stone cutting (sawing, blasting, chipping, grinding)
Mining (cutting through sandstone and granite)	Railroad (setting and laying of track)
Ceramics, clay and pottery	Glass manufacturing
Manufacture and use of abrasives	Manufacture of soaps and detergents
Shipbuilding	

Exposure assessment has been conducted in a number of settings. The New Jersey SENSOR silicosis program had identified 11 cases of confirmed or probable silicosis among workers in road and highway construction (SIC 1611 and 1622). The New Jersey Silica Partnership, representing state agencies, NIOSH, labor unions, the state safety council and ten contractors, was established to address the growing concerns about silica exposure in this industry. They conducted air sampling for silica during road construction tasks, and found exposures over the OSHA Permissible Exposure

continued on other side

Limit (PEL) for several tasks including concrete jack hammering, sawing and cleanup, dowel drilling and others. The highest exposures were 4 to 12 times higher than the existing OSHA standard for silica, which is being considered for revision. Many of these exposures could have been controlled using water to suppress the dust. Similarly, the Construction Occupational Health Program at the University of Massachusetts Lowell found that more than one in five air samples on the Big Dig were above the OSHA PEL. Highest levels were noted during concrete finish work, installing tunnel ceiling panels, demolition, pipejacking and excavation support.

Within dental laboratories, exposure to silica occurs from using investment materials for casting, dental stone mixing, abrasive blasting and acrylic resin and porcelain grinding and polishing.

Clinical aspects

Silicosis is a disabling, nonreversible, and sometimes fatal, fibrotic lung disease caused by overexposure to crystalline silica. Silicotic nodules (small round nodules with upper lung predominance), and eggshell calcifications in lung and lymph nodes characterize the disease. Nodules are firm and intact with a whorled pattern; fibrosis progresses even after removal from exposure. Silicosis increases susceptibility to tuberculosis. Another important complication of silicosis is lung cancer; IARC (International Agency for Research on Cancer) has classified silica as a class 1 human carcinogen.

There are no early symptoms of silicosis. Symptoms are associated with advanced disease and may include cough, fatigue, shortness of breath after exertion, loss of appetite, chest pains and fever. Diagnosis requires a history of silica exposure and a chest x-ray (read by a B reader) consistent with history.

Prevention

Silicosis is a preventable disease. Many of the methods to reduce exposure are known, such as using water to suppress dust on construction and road repair projects and enclosures or local exhaust ventilation for dental laboratory procedures.

Federal and state agencies have sought to reduce the use of silica. OSHA is developing a comprehensive standard for crystalline silica that would reduce the permissible exposure limit to the NIOSH recommended maximum of 50 micrograms per cubic meter. OSHA instituted a special emphasis program in 1996 and state agencies, including the Massachusetts Division of Occupational Safety and the Office of Technical Assistance for Toxics Use Reduction have initiatives to control silica use and inform users of the hazards. Many cities and towns have instituted local laws to prohibit the use of sand for abrasive blasting for exterior paint removal. But, a recent effort to have silica added to the list of chemicals regulated under the Massachusetts Toxics Use Reduction Act was unsuccessful.

The goal of eliminating silicosis should not be abandoned. Physicians and occupational health and safety personnel, to assist in this prevention effort, must monitor silica exposures and resulting health effects.

ASTHMA IN ADULTS[1]

Of all persons with self-reported asthma, an estimated 70% are adults.[2]

Of all office visits for asthma, an estimated 71% are by adults.[3]

Of all visits to the emergency room for asthma, an estimated 69% are by adults.[4]

Of all people hospitalized for asthma, an estimated 65% are adults.[5]

Of all people who die with asthma listed as the underlying cause of death, 97% are adults.[6]

Five to 25% of all asthma in adults is said to be related to their work.[7]

It is therefore estimated that roughly 700,000 to 3.4 million persons have asthma that is work-related.

Estimated total cost of asthma, 1994, in billions of dollars[8]

<= 17 years of age	$634.8
>= 18 years of age	$823.3

1 15 years of age and older
2 National Health Interview Survey Data; 1993-1994, annual average
3 National Ambulatory Medical Care Survey, 1993-1995, annual average
4 National Hospital Ambulatory Medical Care Survey, 1995
5 National Hospital Discharge Survey, 1993-1994, annual average
6 Underlying Cause of Death Dataset
7 Mannino DM. How much asthma is occupationally related? Occupational Medicine: State of the Art Reviews
8 Weiss KB, Sullivan SD, Lyttle CS. Trends in the cost of illness for asthma in the U.S., 1985-1994. J Allergy Clin Immunol 2000:106:493-9
2-6 From Surveillance for Asthma-United States, 1960-1995; MMWR, April 24, 1998, vol 47

Prepared by the National Center for Environmental Health
Centers for Disease Control and Prevention

Number of Work-Related Asthma Cases Reported to Massachusetts SENSOR, March 1992-October 2000

August 2000	September 2000	October 2000	Total to Date (3/92-10/00)
6	2	0	792