Questions from Libby: Tracking Asbestos-Related Disease

In November 1999 a newspaper article by Andrew Schneider, in the Seattle Post-Intelligencer *reported that over the past three to four decades more than 200 residents of Libby, Montana, had died from asbestos-related disease, and many more were currently ill.*

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A team of state and federal public health professionals went to Libby to investigate the *Post-Intelligencer* claim. On the team were a federal Environmental Protection Agency (EPA) toxicologist, a physician from the federal Department of Health and Human Services Region VIII (DHHS), the state epidemiologist for Montana, and Montana's medical officer. What this team found reveals important lessons about the need for multidisciplinary and interagency cooperation and more timely and aggressive disease monitoring.

The apparent source of the asbestos contamination was vermiculite ore from Vermiculite Mountain, about six miles northeast of Libby. The vermiculite mine operated from 1923 to 1990 and during that time produced about 80% of the world's vermiculite.

Vermiculite is a naturally occurring, mica-like mineral. When heated, vermiculite "pops" into a lightweight, fluffy material approximately twenty times its original size. Popped vermiculite is chemically inert, water insoluble, and fire resistant. These physical properties make it useful as an insulation material, a concrete additive, and a soil expander for horticultural use. Fibrous asbestos minerals are commonly found in association with deposits of vermiculite.

Asbestiform minerals can cause the pulmonary disease asbestosis, carcinoma of the lung, and mesothelioma, a malignant tumor of the pleural and peritoneal linings of the chest and abdomen that is found almost exclusively in people exposed to asbestos. Tumors have often spread and metastasized by the time of diagnosis and are frequently fatal over a period of months to two years. Evidence also suggests an association between asbestos ingestion and carcinoma of the colon and the kidney.

Although asbestosis is most commonly a disease of the lung parenchyma (the tissue between the alveoli, where air exchange takes place) this has not been the case with the majority of patients in the Libby area. Doctor Alan Whitehouse, the pulmonolgist who treated many of these individuals, notes that the asbestosis most commonly seen in Libby is a disease of the parietal and visceral pleural tissues (the tissues lining the inside of the chest cavity and the covering of the lungs). It results in a restrictive airway, creating difficulty inhaling and exhaling deep breaths. Individuals with whom I have discussed the problem describe it as having on a jacket that is too small.

Multidisciplinary Response to the Problem

After the public health team substantiated the *Post-Intelligencer* report, it drew a variety of federal, state, and local political officials, as well as local and regional health care providers and medical support agencies, into a response team to address the problem. Representatives came from the EPA, U.S. Agency for Toxic Substances and Disease Reporting (ATSDR), the Region VIII Office of DHHS, the Montana State Department of Public Health and Human Services, the Montana Department of Environmental Quality, and the Lincoln County Health Department. Members of the Libby community also became actively involved in the partnership and formed a Community Advisory Group. The ATSDR took the lead on medical screening, and the EPA focused primarily on contamination and cleanup.

People eligible for medical screening included anyone from the Libby area who

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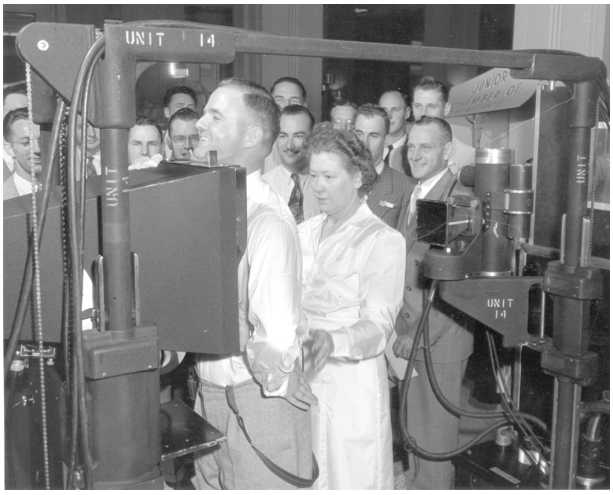
worked directly in the vermiculite industry or in a support service for that industry, as well as anyone who lived, worked, or played within a three-mile radius of the center of Libby for at least six months prior to December 31, 1990. Screening eligibility also included people living in a roughly six-mile-long area adjacent to the road from the town to the mine. The team estimated, based on population density figures and work records, that about 3,000 people would come to the screening.

ATSDR also developed an epidemiological questionnaire to determine various exposure pathways and dosages, about which little information existed. Libby residents had many opportunities for exposure to vermiculite. Many of the Libby school children played in the piles of "popped" vermiculite. Vermiculite was added to home garden soil and used for home insulation. The high school track had been covered with the raw ore, and the baseball field was adjacent to the "popping" mill. When the mill was in operation, it emitted asbestos dust, exposing anyone breathing the ambient air.



Man having chest x-ray, King County, Washington, c. 1948.

Since the primary route of asbestos exposure is most likely through the lungs, medical screening in Libby focused on respiratory abnormalities. Dr. Whitehouse, the pulmonologist who provided care for many Libby residents, had noted a high rate of radiographic pleural changes in this population, so chest radiographs became an important part of the screening. In the end, the full screening included an epidemiological questionnaire, pulmonary function testing (spirometry) to evaluate total lung and expiratory capacity, and three radiographic views of the chest. The International Labor Organization (ILO) has developed a standardized grading system for chest radiographic changes found in pneumoconioses, such as asbestosis. The x-rays should be interpreted by radiologists experienced in the ILO system, called *B-Readers*. Three certified B-readers were contracted to evaluate all the x-ray examinations using ILO criteria. Although a definitive diagnosis cannot be made using these methods, they provide a useful screening test, allowing identification of individuals who need further evaluation.

It is well recognized that the radiographic changes that are associated with asbestos exposure have a long latency period and frequently are not seen before ten or more years after exposure. Because of this, radiographic screening was not conducted on anyone younger than 18. Additionally, all participants were informed that they should have future rescreenings if their chest x-rays were negative. Research is currently being conducted to determine the periodicity of the rescreening.

The response team set up a clinical facility in Libby, brought in equipment, and hired teams to perform the interviews, radiographic readings, and pulmonary function testing. The screening program began the first week in July 2000. When the program was completed at the end of November 2000, a total of 6,144 individuals had been evaluated, more than twice the number originally predicted.

The final results of the screening effort will not be available until summer 2001. However, a February 22, 2001, interim report included the results of screening for 1,078 individuals. (Although the number of individuals included in this report is quite high, it is a convenience sample representing less than 20% of the entire screened population, and therefore may not represent the final rates of disease.)

Preliminary observations included:

1. Sample populations: 127 workers or secondary contractors; 116 with work-related contact; 177 household contacts with workers; 558 with recreational contact with vermiculite; 34 with vermiculite insulation; and 53 with no known exposure source.
2. Thirty percent of the individuals had a pleural abnormality (such as thickening plaque or peritoneal changes suggestive of asbestosis) seen by at least one physician, and nineteen percent had a pleural abnormality reported by at least two of the three B-readers. (One would anticipate seeing these changes in 1-4% at most of the general population.)
3. Pleural abnormalities varied by exposure group, with a 37% prevalence among workers or secondary contractors; 18% for others reporting occupational exposure; 20% for household contacts; 13% for those with recreational contact; 14% with vermiculite insulation; and 14% with no apparent exposure.

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4. Restrictive changes in pulmonary function and radiographic parenchymal changes were encountered in a much lower frequency (less than 2%). The small numbers make it prudent not to draw conclusions on this aspect of disease until the total population of 6,144 has been evaluated.

Since the end of the screening program in November of 2000, about 2,000 additional eligible individuals have requested screening. As a result, ATSDR scheduled a second round of medical screening with identical protocols, starting in August 2001. In addition, ATSDR will conduct a study comparing high-resolution computed tomography (HRCT) with standard radiologic techniques in diagnosing asbestos-related pulmonary disease. HRCT may offer a much more sensitive screening for early asbestos-related changes. This investigation is scheduled for early summer of 2001 and will evaluate approximately 250 subjects. In addition the EPA plans an intense screening of Libby houses known to contain vermiculite insulation, to determine if asbestos is currently present in the ambient air in these houses, since asbestos fibers are known to remain airborne for long periods.

Questions Libby Raises

The Libby experience raises several questions of public health importance.

Could the morbidity and mortality that resulted from asbestos-related disease in Libby have been prevented? Public health officials have known for more than two decades that the workers in Libby and their family members had increased rates of asbestos-related disease. However, it is unclear to what degree the Occupational Safety and Health Administration (OSHA) and the Mine Safety and Health Administration (MSHA) were interacting with the mining corporation to address the potential health problems indicated by these elevated rates

Could more have been done to insure the safety of the workers and their families? The state and federal public health and environmental quality agencies were most likely not aware of the extent of disease in non-occupational groups as this had not been previously recognized or investigated. Sentinel events such as mesotheliomas occur so infrequently, that a relatively small population, such as Libby, could go unrecognized for an extended period unless a specific effort was made to identify them.

Do we need to enhance our surveillance systems to capture data that could result in earlier identification of similar problems? If so what are the sentinel events that we should be sampling, where should the sampling take place, and how often should it occur? Even if this process could be defined, where would the resources come from? Recently the Pew Environmental Health Commission, based at the Johns Hopkins University, School of Hygiene and Public Health, recommended that federal support be provided to develop a national environmental health tracking system. Implementation of such a system could potentially identify adverse health effects earlier.

Nurse and epidemiologist at Rocky Mountain Laboratory, Hamilton, Montana, 1965.

A major public health event, such as the Libby asbestos episode, requires a multidisciplinary approach. No one agency can be everything to everyone in every area. Teamwork, cooperation, and recognition of the limitations of one's capabilities are critical for public health projects of this magnitude to be successful. Every member of the team, from the federal agencies to the community advisory groups, made meaningful contributions. We need to communicate openly with all constituency groups and take advantage of the benefits that come from working together.

Once the Libby medical screening is completed, a large number of people with significant future health care needs will be identified, and because of the long latency of asbestos-related disease, frequently over a period of decades, these numbers will grow. Long-term planning for future screening and health care delivery in Libby and other affected areas needs to be started today.

The Libby experience highlights the need for improved systems of gathering and communicating public health data. It also demonstrates how public health agencies at the federal, state, and local levels, along with the local health care community and citizens, can work together successfully to address a major public health problem.

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Recommended Reading

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