Why Are So Many Workers Still Exposed to Silica?

Experts estimate 1 to 2 million U.S. workers are still exposed to silica. With thousands afflicted by silicosis annually and litigation rising, will silica be the next asbestos?

James Nash *Nov. 16, 2004*

A striking irony about silicosis is that while it is one of the oldest recognized occupational diseases, experts say they really don't know how many people are suffering and dying from it today.

"I know from personal experience lots of silicosis is misdiagnosed or not recognized," says Tee Guidotti, M.D., Ph.D., director of the division of occupational medicine and toxicology in the School of Medicine at George Washington University.

Many other experts agree that silicosis is a far bigger issue than the story told by the official numbers. Indeed, it may be that the principal reason silica remains such a deadly hazard in U.S. workplaces is because too many people think it's no longer a serious problem.

Official Numbers

Silicosis is caused by breathing small particles of crystalline silica. Once the particles are inside the lungs, they become trapped and cause areas of swelling around them. Over time, these swollen areas grow larger, breathing becomes increasingly difficult, and lung failure may cause death. In addition, silica exposure is also being connected to diseases besides silicosis, including cancer, tuberculosis, immunological disorders and kidney ailments.

Occupational exposure to silica particles of respirable size occurs in a variety of occupations, including mining, quarrying, drilling and sand blasting activities. Because silica sand is an inexpensive and versatile component of many manufacturing and construction processes, millions of workers throughout the world are at risk for the disease.

There are three types of silicosis:

- Chronic silicosis, the most common form of the disease, usually develops after 10 or more years of exposure to relatively low dust concentrations.
- Accelerated silicosis results from exposure to high concentrations of silica over a 5- to 10-year period.
- Acute silicosis is a rare but highly fatal disease that is caused by brief but massive exposure to dust with high quartz content.

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David Goldsmith, Ph.D., associate research professor, division of occupational medicine and toxicology in the School of Medicine at George Washington University, recalls that the worst case of acute silicosis occurred in the 1930s during the construction of the Gauley Bridge hydroelectric tunnel at Hawk's Nest, W.Va.

Approximately 2,000 workers were digging a tunnel through high-silica rock with no respiratory protection, even though the health effects of silica exposure had been documented for decades. As many as 1,500 men died as a result of inhaling silica dust. This incident, sometimes called America's worst industrial disaster, introduced the nation to the dangers of silica dust.

The Work-Related Lung Disease Surveillance Report issued by the National Institute for Occupational Safety and Health (NIOSH) states, "Over the past several decades, silicosis mortality has declined, from well over 1,000 deaths annually in the late 1960s to fewer than 200 per year in the late 1990s."

Though the country would seem to be winning the war against silica-related deaths, Goldsmith cites current estimates that 2 million U.S. workers are still exposed to silica. He and other experts including NIOSH researchers say the true prevalence of the disease is unknown.

"It looks like it's not a big problem, but the national data are bad on this condition," says Edward Petsonk, M.D., senior medical officer in the Division of Respiratory Disease Studies at NIOSH's Morgantown, W.Va. research center.

The annual number of silicosis deaths does not begin to tell the story of how many people suffer from the disease. First, not all cases of silicosis are fatal. Second, even in death, the disease is often undiagnosed. Petsonk and other experts point to the startling results of a recent study by Kenneth Rosenman, M.D., professor of medicine at Michigan State University, published last year in the American Journal of Industrial Medicine.

"Our research showed that silicosis deaths represent 4 to 8 percent of the silicosis cases per year," says Rosenman. "This means estimates based on deaths alone miss more than 90 percent of the silicosis cases in the country." By that calculation, some 2,500 to 5,000 silicosis cases could be occurring each year.

In addition, Rosenman's study revealed that 53 to 77 percent of the silicosis cases that occurred each year in Michigan were either not being diagnosed or not reported to the state's surveillance system.

Data Problems

Why is silicosis so often misdiagnosed or unrecognized? The mistaken belief that silicosis has been "solved" makes it harder to recognize and address the continuing problem of silica exposure.

"Because of their training, physicians typically don't ascribe diseases to work," explains Guidotti. "If you've been taught occupational diseases aren't common, you put them at the bottom of your list."

Second, Guidotti believes that "in the field of occupational health, we are very quick to pat ourselves on the back for solving problems that haven't been solved at all."

The bad data, in turn, complicate the government's effort to address silica hazards through regulation. For years, OSHA has been working on a silica standard, but it is far from certain when, or whether, such a standard will be issued. "Right now, OSHA is having a hard time justifying the additional controls of a new standard, because a lot of the cases aren't being recognized," says Petsonk.

Currently, OSHA seeks to control silica hazards through enforcement of a permissible exposure limit (PEL) for silica, but Petsonk thinks a comprehensive standard would help because it would require employers to take additional control measures.

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Guidotti believes the problem is not that OSHA's silica PEL is inadequate. "It's the enforcement of OSHA's PEL that is completely inadequate," he says. The biggest problems are in mining and construction. While compliance has improved in sandblasting operations in the oil patch, he believes there are still episodes of exposure there as well.

NIOSH reports that according to data from the Mine Safety and Health Administration (MSHA), respirable quartz exposure levels remained relatively constant in the coal mining industry from 1979 to 1999. NIOSH also says the construction and mining industries accounted for at least one-third of decedents with silicosis from 1990 to 1999.

David Woods is an environmental hygiene manager for Fibertec Industrial Hygiene Services Inc., a consulting firm with headquarters in Holt, Mich. that helps companies deal with silica and other industrial hygiene issues. "When it comes to silica, a lot of companies don't have a clue," Woods replies, when asked whether non-compliance with OSHA's silica PEL is common. "I'm talking about worker education, engineering controls, respiratory protection, work practices, air sampling and personal exposure monitoring."

He adds that Michigan's state plan OSHA is focusing on silica currently because of the problem.

The Next Asbestos?

"Silica litigation is increasing steadily," says Gerald Matics, editor of "Mealey's Silica Litigation Report." Mealey Publications, based in King of Prussia, Pa., tracks federal and state litigation in over 50 areas, including asbestos and silica. The company also tracks anything related to such litigation, such as medical studies, how other nations are responding to the issues, and federal or state legislation.

Matics says that silica litigation is not yet rising at the rate of asbestos, but he sees a connection between the two. "One theory I've heard is that silica is increasing because lots of plaintiff's attorneys are searching around for the 'next asbestos.'"

"A lot of attorneys believe the end of asbestos may be coming, so they are keeping an eye on other areas," comments Pete Kelso, editor of "Mealey's Asbestos Litigation Report." Federal legislation that would put an end to asbestos litigation remains a possibility, and many states already have passed laws that limit such lawsuits. Silica is a logical hazard for lawyers to pursue, as Matics points out that many asbestos and silica exposures happened at the same time, in the same workplaces. Moreover, there is now a "litigation infrastructure" of physicians and expert witnesses in place and ready to testify on both hazards.

"Some attorneys will settle an asbestos claim, but then see some silicosis and now they have another claim," Matics explains.

Many lawsuits now include both silica and asbestos, Kelso points out, complicating the effort to compare the two hazards, while confirming the link between them.

Still, in terms of the numbers of lawsuits and plaintiffs, silica has a long way to go to reach the level of asbestos. "The popular catch phrase out there is that silica will be the next asbestos," Kelso says. "It is premature to say it will become the next asbestos, but silica claims are growing."

Ignorance or Criminal Behavior?

Silicosis cannot be cured, but experts say it can be prevented.

"Every time I see a young person with severe scarring in the lungs from silicosis, I get outraged," says Petsonk, who sees a lot of X-rays as part of his job at NIOSH. "There's no reason why this should occur. It's the result of ignorance, the refusal to acknowledge something or even criminal behavior."

Petsonk says effective strategies for protecting workers from silica dust will depend upon

the specifics of the worksite.

- The best choice is not to use silica at all: there are often cost-effective substitutes for silica that are far safer. This is an area where the United States has fallen behind other countries. For example, many European nations have banned sand blasting. Alternatives less hazardous than silica can be used for cleaning operations, according to Petsonk.
- Use engineering controls. Cutting masonry or concrete can create clouds of dangerous silica dust, but "wet methods" can control these hazards . Vacuums can be attached to grinding machines and are also effective at sucking up dust. When exposure occurs indoors, a good ventilation system is essential.
- Wear respiratory protection. "I never want to put a guy in a respirator if I don't have to, but sometimes you don't have a choice," says Woods. Companies using respirators must comply with OSHA's Respiratory Protection Standard (1910.134). Some of its requirements include: a written respiratory protection program, medical surveillance if negative pressure respirators are used, fit-testing, cleaning and maintenance of respirators.

"Respirators have proven to be pretty effective if they're worn right and fit right," comments Woods. "The problem I see out in the field is that the guys doing the cutting aren't real concerned about wearing respirators or taking care of them." Other silica experts say the dangers faced by workers near the cutting operation, who may need to wear respirators even if they aren't doing the cutting, are often overlooked.

Woods believes respirators can also lead employers into a dangerous complacency when it comes to protecting against silica hazards.

"Respirators should be the last line of defense," he contends. "Too many people think you just slap one on and don't have to think about engineering controls, such as wet methods."

A Persistent Obscenity

When NIOSH last issued a nationwide alert on silicosis, J. Donald Millar, NIOSH's director at the time, called the disease "an occupational obscenity because there is no scientific excuse for its persistence."

Millar's words are 14 years old. With OSHA's silica rulemaking stalled, mounting litigation, and growing evidence that thousands of workers are contracting silicosis every year, there are, unfortunately, still good reasons to believe in the persistence of these "obscene" excuses.

Sidebar: Protecting Workers from Silicosis

The symptoms of silicosis include shortness of breath, cough and difficulty in breathing with physical exertion, according to the National Institute for Occupational Safety and Health (NIOSH). Because of the common nature of these symptoms, the disease is frequently misdiagnosed or proceeds undetected. The disease is diagnosed on the basis of its symptoms in conjunction with work history and X-ray assessments of dust-induced lung damage.

- Hazard Recognition is the first step in protecting workers, one that is often missed, according to silicosis experts. NIOSH recommends assessing the potential for worker exposure to crystalline silica before rock drilling or other possible exposures begin. "Keep your eyes open for any operation that produces fine dust," advises Tee Guidotti, MD, Ph.D., an occupational physician in the School of Medicine at George Washington University.
- Use Engineering Controls to reduce silica exposures, or find safer alternatives.
- Conduct Air Sampling to measure worker exposures.
- Regular Medical Examinations must be provided to any worker exposed to silica.
- Educate Workers about health effects, work practices and personal protective equipment for silica.
- Wear Washable Protective Clothes or clothes that can be disposed of at the worksite. Shower and change into clean clothes before leaving the worksite to prevent the contamination of cars, homes and other work areas.
- Use Respiratory Protection as a last line of defense if silica exposures cannot be kept below

NIOSH's recommended exposure limit of 0.05 mg/m^3. Consult OSHA's Respiratory Protection Standard (1910.134) for details about how to comply fully with this rule.

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