

Viewpoint: Turning the Air Blue

Deadly Countertops: An Urgent Need to Eliminate Silicosis among Engineered Stone Workers

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In 1927, construction began on the Hawks Nest Tunnel in West Virginia. Celebrated initially as an important hydroelectric project, it soon became the site of one of the worst occupational disasters in U.S. history. Nearly 3,000 workers – mostly Black men who had traveled from the South looking for work – drilled through a sandstone mountain, generating extensive silica-containing dust. Minimal dust control efforts were made, and workers were not provided with respiratory protection. In the months and years that followed, many developed severe silicosis, and close to 1,000 died, most buried nearby in unmarked graves. This disaster ultimately led to Congressional investigation and a “Stop Silicosis” workplace safety campaign led by Secretary of Labor Frances Perkins.¹

Exposure to respirable crystalline silica almost always occurs in occupational settings, and the risk of silicosis from work with silica-containing products has been known for centuries. Recently, however, a new silicosis epidemic has emerged among workers who cut and finish engineered stone (also known as artificial stone or “quartz”) countertops. This material is made of crushed stone bound by resins, with added pigments. Known for its durability, colors, and patterns, engineered stone has grown in popularity over the past decade to become the most used countertop material in the United States.²

This rise in popularity, however, has had deadly consequences for workers. Engineered stone typically contains more than 90% crystalline silica, a much higher fraction than common natural stone materials such as granite (30%) or marble (<10%). When workers cut, polish, and finish engineered stone slabs, large quantities of silica dust can be released, along with toxic volatile organic compounds and metals. These repeated extreme exposures place workers at risk of severe, accelerated silicosis. Cases of silicosis, including advanced cases requiring lung transplantation, were first reported over a decade ago in engineered stone countertop workers in Spain and Israel, and more than a thousand cases have since been identified worldwide.^{3,4,5,6}

We identified the first cases of silicosis among engineered stone countertop workers in California in 2019, and by 2023 had identified 52 cases.³ By November 2024, the total had reached 219, including at least 14 deaths, and 26 lung transplants. Clusters of cases have also been reported in other states.⁷ Engineered stone workers are rarely offered required employer-sponsored medical screening for silicosis, lack access to healthcare, and often face delayed or missed diagnoses when they do seek care.^{3,8} When cases are diagnosed, healthcare providers do not report them consistently to public health authorities. While California has expanded public health surveillance and conducted outreach to providers, the cases identified to date in California are likely just the tip of the iceberg; under-recognition of cases may be even more pronounced in other states that have not placed similar emphasis on the issue.

Notably, many engineered stone workers with silicosis are relatively young, have rapidly progressive disease, and have undergone lung transplantation or died within just a few years of diagnosis. In many countries, engineered stone countertop workers are from immigrant communities, have few workplace protections, and face difficulty accessing necessary healthcare resources. Nearly all cases in California have occurred among immigrants from Mexico and Central America, many of whom are likely undocumented.³

This epidemic is particularly tragic as silicosis is completely preventable. In the countertop industry, silica exposure can be reduced with water, ventilation, and fit-tested respirators. In the United States, Occupational Safety and Health Administration (OSHA) regulations require employers to keep silica dust levels below the permissible exposure limit (PEL) of 50 $\mu\text{g}/\text{m}^3$. Nonetheless, workers continue to be overexposed. Sophisticated water-fed tools and ventilation systems and appropriate respiratory

protection can be expensive for the many small, informal businesses and self-employed workers in this industry, and these controls require frequent monitoring and maintenance. OSHA has inspected only several hundred of the more than 10,000 U.S. employers in this industry; most inspected employers have not been compliant with existing silica regulations.^{9,10}

In Australia, where hundreds of cases of silicosis among engineered stone countertop workers have been identified since 2015, regulations were tightened to require additional control measures for engineered stone work, alongside new certification programs, inspections, and educational campaigns. A national task force was assembled to review evidence and provide recommendations. This task force found that hazardous levels of silica dust exposures persisted despite new policies, and Australia became the first country to ban use of engineered stone as of July 2024.¹¹

In response to the silicosis epidemic in California, the California Division of Occupational Safety and Health (Cal/OSHA) passed an emergency temporary regulation in December 2023 tightening silica safety requirements for engineered stone work. Federal OSHA has also established an enforcement initiative. Yet, enforcement efforts alone are unlikely to adequately reduce hazardous exposures to silica dust in this industry.

Comprehensive solutions are urgently needed. Following the Australian example, the United States should establish a national task force to review current evidence and provide policy recommendations for the prevention of silicosis among engineered stone countertop workers. If current policies cannot adequately protect workers, the United States should consider following in Australia's footsteps and banning the sale of crystalline silica-containing engineered stone. This is likely to be the most effective strategy for primary prevention of silicosis, as it does not rely on controls implemented by individual

employers and workers. Recent bans by the U.S. Environmental Protection Agency of two other toxic products, asbestos and methylene chloride, under Toxic Substances Control Act authority, provide a potential model for such action. In the meantime, consumers shopping for countertops can consider choosing alternative products with lower or no silica content to protect worker health.

Clinicians can also play an important role in addressing this epidemic by taking an occupational history and asking specifically about engineered stone work; diagnosed cases should be reported to public health (Table). In Australia, many regions have implemented government-sponsored medical screening programs for countertop workers. The United States should consider establishing a national medical screening and surveillance program for this industry, like that established in 1970 for coal miners under the legislatively mandated Coal Workers' Health Surveillance Program. Identification of cases helps ensure that already-affected workers receive appropriate medical care, and enumeration of cases via public health surveillance helps provide a continued case for policy action.

Nearly a century after Hawks Nest and Frances Perkins's Stop Silicosis campaign, workers are still dying from this preventable occupational lung disease. If silica exposures among engineered stone countertop workers continue unabated, the morbidity and mortality may ultimately dwarf the scale of the Hawks Nest Tunnel disaster. Urgent action is needed to protect vulnerable workers from this serious health hazard.

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Clinical Guide to Silicosis in Engineered Stone Countertop Workers
Who is at risk?
Workers who cut, polish, and grind engineered stone (quartz) materials can be exposed to very high levels of silica dust, which can cause rapidly progressive, potentially fatal silicosis .
Identifying patients with silicosis
<ul style="list-style-type: none"> • Patients may present with cough and/or shortness of breath, or be asymptomatic in early disease stages. • Providers should take an occupational history, asking specifically about engineered stone work (e.g., "Have you done work cutting or finishing quartz countertops?"). • Consider silicosis in both asymptomatic and symptomatic countertop fabrication work. • Order chest imaging and pulmonary function tests (PFTs) when silicosis is suspected. <ul style="list-style-type: none"> ○ Chest x-ray may have limited sensitivity for silicosis. ○ Consider follow-up chest computerized tomography (CT) if x-ray is negative and index of suspicion is high.
Diagnostic criteria
<ol style="list-style-type: none"> 1. History of silica dust exposure 2. Chest imaging and/or lung pathology* consistent with silicosis 3. Absence of another explanatory diagnosis
Next steps following silicosis diagnosis
<ul style="list-style-type: none"> • Refer patients to Pulmonary and Occupational Medicine providers. • Connect patients with workers' compensation and relevant legal resources. • Report cases to the state or local public health department.** • With patient's consent, report cases to relevant state or federal Occupational Safety and Health (OSHA) office.
Management
<ul style="list-style-type: none"> • Avoidance of further silica exposure (may be challenging for patients who depend on this work for their livelihood). • Evaluation for associated conditions, including rheumatological disorders and mycobacterial infections. • Serial PFT monitoring. • Supportive care with bronchodilators for symptom management and supplemental oxygen when needed. • Referral for lung transplant evaluation when respiratory failure progresses.
Additional resources
<ul style="list-style-type: none"> • Information for providers on the California Department of Public Health website: https://www.cdph.ca.gov/Programs/CCDC/DEOD/OCID/Pages/silicosis.aspx • Silicosis review for clinicians: https://www.sciencedirect.com/science/article/abs/pii/S0272523120300873 • Hazard alert for workers (also available in Spanish and Chinese): https://www.cdph.ca.gov/Programs/CCDC/DEOD/OCID/CDPH%20Document%20Library/SilicaHazardMay2024.pdf

*Lung biopsy is not required for silicosis diagnosis, but may be warranted in cases where the diagnosis is uncertain.

**Public health reporting of silicosis cases is mandatory in certain U.S. states; providers should ensure compliance with these requirements. Voluntary reporting is encouraged in jurisdictions without reporting requirements.