Rise in Lung Transplantation for Coal Workers' Pneumoconiosis and Silicosis

David J. Blackley, DrPH[1*], Noemi B. Hall, PhD[1], Jennifer Flattery, MPH[2], Drew A. Harris, MD[3], Kristin J. Cummings, MD[2], A. Scott Laney, PhD[1]

[1]Respiratory Health Division, National Institute for Occupational Safety and Health

[2]Occupational Health Branch, California Department of Public Health

[3]Department of Medicine, University of Virginia

*Corresponding author: David J. Blackley, Surveillance Branch, Respiratory Health Division, National Institute for Occupational Safety and Health, 1095 Willowdale Rd, Mailstop HG900.2, Morgantown, WV 26505. E-mail: dblackley@cdc.gov. Phone: 304-285-6379

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To the Editor:

The United States is experiencing unprecedented epidemics of the most severe form of coal workers' pneumoconiosis (CWP) in coal miners and silicosis in engineered stone countertop fabricators.[1, 2] Over the past two decades, industry-wide surveillance of U.S. coal miners documented a sharp rise in the prevalence of CWP, concentrated in the central Appalachian states of Kentucky, Virginia, and West Virginia. One-in-five veteran coal miners currently working in this region has radiographic evidence of CWP.[3] Unlike for coal miners, there is no systematic medical monitoring of engineered stone fabricators in the United States, and public awareness of the respiratory hazards associated with this work is more limited. Recent U.S.-based reports by Fazio and Rose described >60 cases of silicosis in engineered stone fabricators, mostly among Latino immigrants in California, Colorado and Texas.[2, 4] Larger scale surveillance of 1509 engineered stone workers in two Australian states identified 362 (24%) cases of silicosis, leading to a national ban on the manufacturing and use of engineered stone products.[5] With the skyrocketing popularity of engineered stone countertops in American homes, and the nearly 100,000 workers employed by the U.S. stone fabrication industry, there are concerns that many cases are going unrecognized and the scale of this epidemic could grow dramatically.

CWP and silicosis are progressive and irreversible, and in some patients with disabling disease, lung transplantation is the only therapeutic option. Until the early 2000s, lung transplants for these conditions were rare. However, data from the Organ Procurement and Transplantation Network (OPTN), which contracts with the United Network for Organ Sharing to maintain a registry of all U.S. organ transplants, have identified recent increases in the number of lung

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transplants for occupational lung diseases, similar to the overall trend for adult lung transplantation.[6] Because of the ongoing problem of CWP in Appalachia and the outbreak of silicosis in U.S. stone fabricators, we analyzed OPTN data for adult thoracic organ transplants performed through December 31, 2023. Applying methods described previously,[6] we used a combination of numeric and text data to identify probable cases of CWP and silicosis.

During 1991–2023, we identified 105 probable lung transplants for CWP and 109 for silicosis nationally (Figure). The highest number of transplants (16 cases) for both conditions occurred in 2023. Each of the CWP patients was male and the mean age was 59.9 years. Nearly all (104; 99%) CWP patients were non-Hispanic white and 90 (86%) were residents of Kentucky, Virginia, or West Virginia. A majority (62; 59%) of the lung transplants for CWP were covered by public insurance. Among the silicosis patients, 106 (97%) were male, the mean age was 52.2 years, 76 (70%) were white, 7 (6%) were black, and 26 (24%) were Hispanic/Latino. Half of the lung transplants for silicosis were covered by public insurance. By state of residence, the highest number of silicosis patients receiving lung transplants lived in Pennsylvania (14), California (13), Wisconsin (7) or West Virginia (7). Notably, among the 16 lung transplants performed in 2023, 8 were in Hispanic/Latino residents of California.

Occupational exposure to respirable crystalline silica dust is a key causal factor in both the CWP and engineered stone silicosis epidemics. In 2016, the Occupational Safety and Health Administration (OSHA) updated its silica standard for construction and general industry by reducing the exposure limit and requiring that medical monitoring be offered to workers with elevated silica exposures, although there is no requirement for centralized reporting. The 2016 standard was challenged in Federal court and upheld. In 2020, OSHA supplemented the

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standard with a National Emphasis Program for industries with high silica exposures, followed by a 2023 enforcement initiative focused on engineered stone fabrication and installation. California also enacted an Emergency Temporary Standard for general industry that identifies dry cutting as an imminent hazard and requires engineering and work practice controls, silica-related safety trainings, respiratory protection and exposure monitoring. Notably, employers and their contracted healthcare providers are required to report silicosis cases to state health authorities. California is in the process of adding silicosis to the state's list of reportable diseases, a requirement that will apply to all healthcare providers and could lead to identification of more cases given the shift to electronic case reporting (eCR) between healthcare organizations and public health agencies.[7]

Recent radiographic and pathologic studies of Appalachian coal miners demonstrate the significant role of silica in contemporary miners with severe CWP.[8, 9] The Mine Safety and Health Administration's (MSHA) 2024 silica final rule was responsive to these scientific findings and reduces the silica exposure limit in coal mines to align with other U.S. industries.[10] In April 2024, a petition was filed by a coalition of industry representatives in federal appeals court challenging the rule, and in July 2024, the House Appropriations subcommittee with jurisdiction over MSHA's budget stipulated in its appropriations bill markup that no funds may be used to administer, implement or enforce the rule. The future of MSHA's silica rule remains uncertain.

CWP and silicosis are completely preventable, and disproportionately impact two economically marginalized populations: rural Appalachian coal miners and immigrants from Latin America. Since 2017, there have been >1,000 newly identified cases of the most severe form of CWP in

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Appalachian coal miners examined at federally funded Black Lung Clinics[1], and since 2019, California has identified 219 confirmed cases of engineered stone-associated silicosis, including at least 14 deaths, among young (median age, 46 years) Hispanic/Latino (97%) workers. Although OPTN data don't include information on patients' occupation or industry, active follow-up in California demonstrates that at least 23 of 25 (92%) of known lung transplants for silicosis since January 2023 were in patients who worked in the engineered stone fabrication industry (J. Flattery, personal communication, November 20, 2024). These numbers likely vastly underestimate the burden of disease, given issues encountered by this population with access to care and diagnostic delays in recognizing occupational diseases including silicosis.[2] Clinicians can play a critical role in addressing the ongoing contributions of silica dust to our nation's respiratory health inequities. This role begins by asking patients about work – a key social determinant of health. By making the correct diagnosis, and prescribing exposure cessation, morbidity and mortality can be prevented.[11] Efforts to mitigate the resurgent trends of silicosis and CWP will also require diligent exposure prevention and systematic medical monitoring of current and former workers for years to come.

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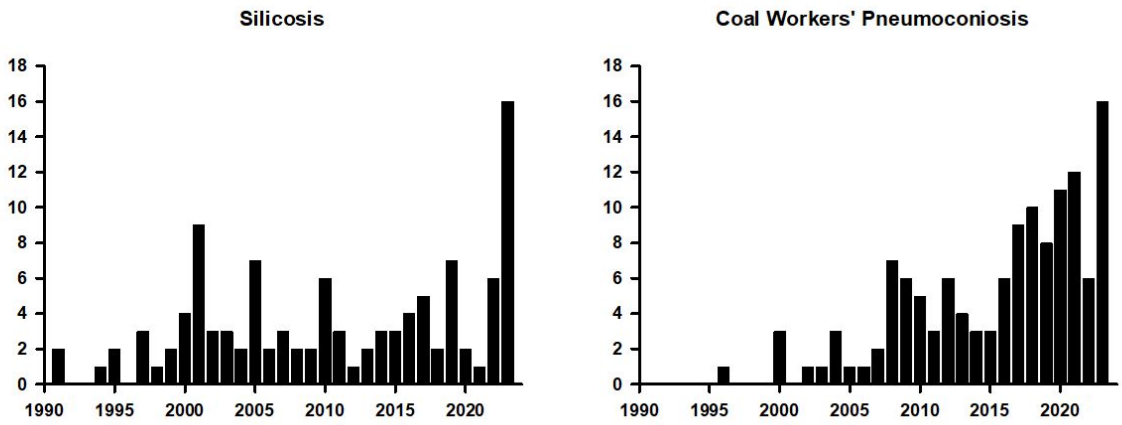

Figure: Number of lung transplants for silicosis and coal workers' pneumoconiosis by year. Data from United Network for Organ Sharing.

Figure 1. Number of lung transplants for silicosis and coal workers' pneumoconiosis by year. Data from United Networks for Organ Sharing.

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Disclaimers

The findings and conclusions in this report are those of the author(s) and do not necessarily represent the official position of the National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention.

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