SILICOSIS FROM ENGINEERED STONE:
BACKGROUND AND SCOPE OF THE PROBLEM

Public Health Surveillance

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Silicosis: Old Disease, New Risks

• Silicosis is a severe, incurable lung disease caused by inhaling silica dust particles.
• Engineered stone (artificial stone, quartz), material used for kitchen countertops, contains especially high levels of silica (>90%).
• Workers who cut and grind engineered stone (stone fabricators) can be exposed to hazardous levels of silica dust.

Photo credit: Earl Dotter
Respirable Crystalline Silica (RCS)

Table Salt
Silica dust is dangerous.
Silica dust is dangerous.

- Respirable crystalline silica exposure
- Lung inflammation
- Lung scarring
- Respiratory failure

LARGEST INHALABLE PARTICLES

‘RESPIRABLE FRACTION’
Engineered Stone: Growing Demand

U.S. Engineered Stone Countertop Demand, 2007-2021 (million square feet)

Source: The Freedonia Group
Silicosis Related to Engineered Stone
California Index Case

- 37-year-old man hospitalized with silicosis in 2017
California Index Case

- 37-year-old man hospitalized with silicosis in 2017
  - 2004-2013: Worked at a countertop fabrication shop
California Index Case

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  - **2013:** Diagnosed with silicosis
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  • 2013: Diagnosed with silicosis
  • 2014-2017: Worsening symptoms, lung function
California Index Case

• 37-year-old man hospitalized with silicosis in 2017
  • 2004-2013: Worked at a countertop fabrication shop
  • 2013: Diagnosed with silicosis
  • 2014-2017: Worsening symptoms, lung function
  • 2018: Ineligible for lung transplant, dies of silicosis
Workplace Investigation

Hospital discharge records
Investigation with Cal/OSHA

All were Hispanic men in their 30s at diagnosis.
Two cases were fatal.

Workforce Screening

Silicosis by chest X-ray 12%

Median age of cases detected by screening was 37.

Surveillance Methods

• Tracking silicosis cases in California
  • Hospital data (discharge and emergency)
  • Voluntary provider reporting
  • Piloting: electronic case reporting (eCR)
  • Coming soon: reportable condition
  • NIOSH surveillance case definition
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• Enumerating countertop fabrication shops
  • Business database
  • Web searches
  • Outreach
Cases Increasing in California

Year identified by CDPH

No. cases

*through April 2024
Young Immigrant Workers Affected

- **132 fabrication workers with silicosis**
  - Most in their 30s and 40s
  - Almost all immigrants from Mexico & Central America
  - Many under/uninsured
- At least **13 deaths**
- At least **17 lung transplants**
The Tip of an Iceberg?

- >900 shops in CA
- Silicosis prevalence estimates
  - 12% in one CA workplace
  - >20% in Australian screening programs
- Likely many unidentified cases
OSHA Silica Standard for Employers (2016)

- **Determine amount of exposure**
  - Action Level: 25 μg/m³
  - Permissible Exposure Limit: 50 μg/m³
- **Use exposure controls**
- **Train workers** on health effects
- **Offer medical exams**
  - CXR, spirometry, TB test

Cal/OSHA Special Emphasis Program (SEP)
Cal/OSHA Special Emphasis Program (2019-2020)

Inspections opened: 106

Air sampling performed: 47
47 companies with $\geq 1$ exposure measurements

Exposure Category
- Above PEL ($>50 \, \mu g/m^3$)
- Between AL and PEL
- Below AL ($<25 \, \mu g/m^3$)

RCS Exposure ($\mu g/m^3$)

24 (51%)

7 (15%)

16 (34%)
47 companies with ≥1 exposure measurements
24 (51%) had ≥1 exposures above the PEL

Exposure Category
- Above PEL (>50 µg/m³)
- Between AL and PEL
- Below AL (<25 µg/m³)
Worker Interviews (n=92)

- Young (median age 39)
- Short tenure (median 3.8 years)
- Many Spanish-speaking (39%)
- Performed dust-generating tasks (91%), using dry methods (26%)

- Most not informed of air sampling (68%)
- Few fit tested (20%) or offered medical examinations (5%)

Spiegel et al. AJIM. 2022; 65(12):1022-1024.
RCS Standard Violation Citations

- Any section: 72%
- Exposure assessment: 68%
- RCS hazard comm.: 43%
- Medical surveillance: 36%

Number of Employers (N = 47)
Number of Employers (N = 47)

- Any section: 57%
- Resp. Protection Prog.: 26%
- Fit testing: 23%
- Medical evaluation: 15%
Emergency Temporary Standard (ETS)

• In effect since December 29, 2023
• Introduces new protections for “high exposure trigger tasks”
  • Requires wet methods
  • Prohibits dry cutting, sweeping
  • Requires tight-fitting, full-face, powered air-purifying respirator (PAPR)
• Defines “imminent hazards” and allows Cal/OSHA to issue “order prohibiting use” when imminent hazards present

Photo credit: Chaolong Xi, NIOSH
Summary: Silicosis from Engineered Stone

- Large and growing problem in California
- Impacts young, immigrant workforce
- Surveillance depends on screening, diagnosis, reporting
- Burden of disease likely underestimated
- Non-compliance with silica regulations is widespread
- ETS introduces new requirements and new authority
New Continuing Medical Education Course

• Free 1-hour online course
• 1 AMA PRA Category 1 credit
• More info: [https://erc.ucla.edu/course/silicosis-in-countertop-fabrication-workers/](https://erc.ucla.edu/course/silicosis-in-countertop-fabrication-workers/)
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