

Dentistry, Respiratory Hazards, and NIOSH

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National Occupational Safety and Health

Centers for Disease Control and Prevention

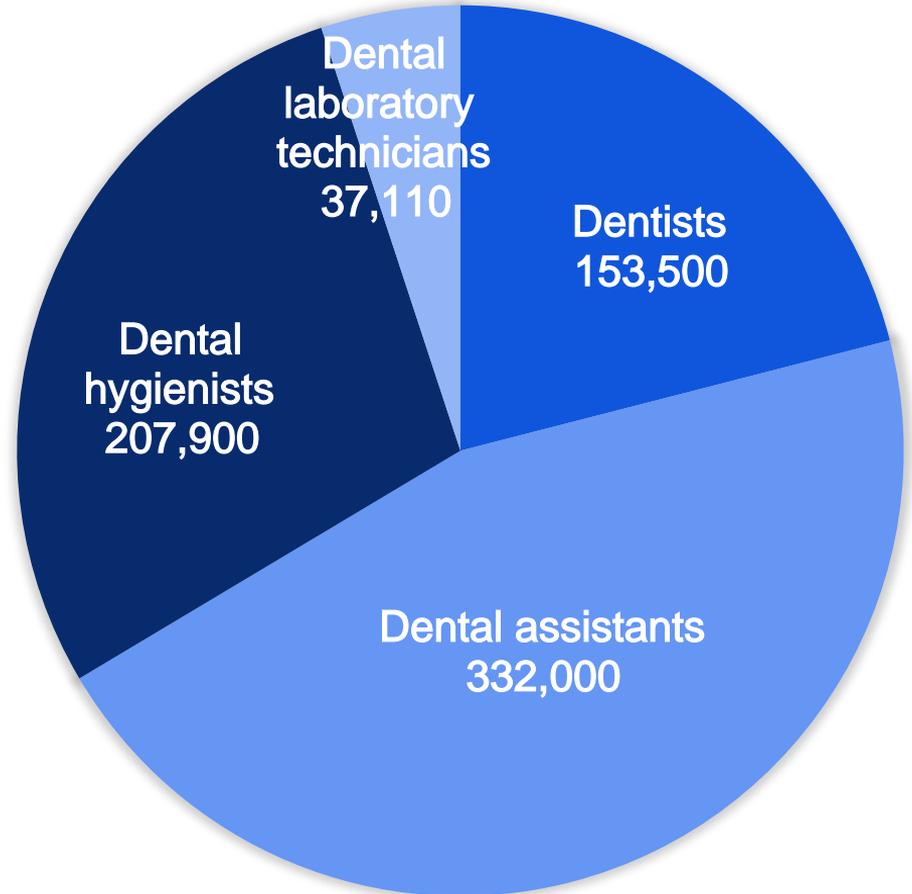
HCSA Sector Council Meeting

August 9, 2019



Dental Personnel

- About 730,000 dental personnel in the United States





Respiratory Hazards in Dentistry

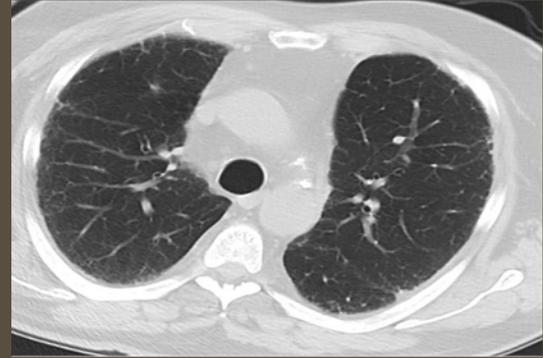
- Infectious agents
- Particulates
 - Dusts
 - Fumes
 - Mists
- Gases
- Vapors
- Radiation
- Other hazards

Occupations and Work-Related Lung Diseases

- Coal worker's pneumoconiosis or "black lung disease"
- Shipbuilders and mesothelioma
- Bakers and occupational asthma
- Bar tenders and chronic obstructive pulmonary disease (COPD)

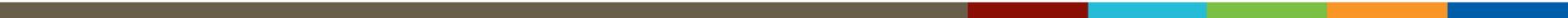
Occupations and Work-Related Lung Diseases

- Coal worker's pneumoconiosis or "black lung disease"
- Shipbuilders and mesothelioma
- Bakers and occupational asthma
- Bar tenders and chronic obstructive pulmonary disease (COPD)
- What about dentists and other dental professionals?



Idiopathic Pulmonary Fibrosis (IPF)

Idiopathic Pulmonary Fibrosis (IPF)

- Chronic progressive lung disease without known cause
 - Difficulty breathing that slowly worsens and dry cough
 - Likely caused by cycles of epithelial injury and dysregulated repair
 - Median survival 2-5 years
- 



<https://radiopaedia.org/cases/normal-chest-ct-lung-window-1?lang=us>



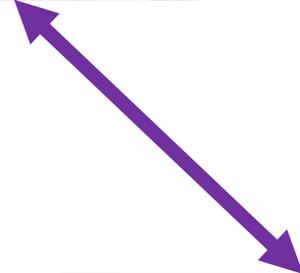
Antonella Caminati et al. *Eur Respir Rev* 2017;26:170047

IPF Epidemiology

- Increased incidence and prevalence with increasing age — presentation most common in 50s-60s
- United States
 - Incidence = 0.22 to 0.88/100,000
 - Prevalence = 0.5 to 27.9/100,000
- Risk factors
 - Cigarette smoking
 - Exposure to stone, metal, wood, and organic dusts
 - Gastroesophageal reflux disease



NIOSH



Morbidity and Mortality Weekly Report

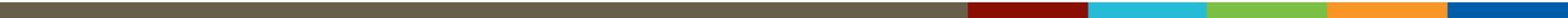
Dental Personnel Treated for Idiopathic Pulmonary Fibrosis at a Tertiary Care Center — Virginia, 2000–2015

Randall J. Nett, MD¹; Kristin J. Cummings, MD¹; Brenna Cannon²; Jean Cox-Ganser, PhD¹; Steven D. Nathan, MD²

In April 2016, a Virginia dentist who had recently received a diagnosis of idiopathic pulmonary fibrosis (IPF) and was undergoing treatment at a specialty clinic at a Virginia tertiary care center contacted CDC to report concerns that IPF had been diagnosed in multiple Virginia dentists who had sought treatment at the same specialty clinic. IPF is a chronic, progressive lung disease of unknown cause and associated with a poor prognosis (1). Although IPF has been associated with certain occupations (2), no published data exist regarding IPF in dentists. The medical records for all 894 patients treated for IPF at the Virginia tertiary care center during September 1996–June 2017 were reviewed for evidence that the patient had worked as a dentist, dental hygienist, or dental technician;

1988–2005, the estimated annual incidence of IPF varied from 6.8 to 17.4 per 100,000 population, and the estimated prevalence varied from 14.0 to 63.0 per 100,000 population (3) and increased with increasing age (2). No published data could be found regarding dental personnel and IPF.

In June 2017, the electronic medical records of all 894 patients with a diagnosis of IPF treated at the Virginia specialty clinic during September 1996–June 2017 were reviewed to identify patients having the occupation of dentist, dental hygienist, or dental technician. Available electronic medical records of patients identified as having one of these occupations were reviewed, pertinent data were abstracted, and an attempt was made to interview living patients to ascertain



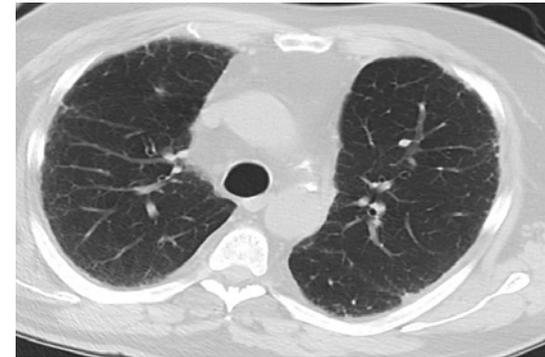
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Reviewed electronic medical records of all 894 patients with IPF diagnosis at Virginia specialty clinic during September 1996–June 2017

Identified patients known to be dentists, dental hygienists, dental technicians, or dental assistants

Abstracted medical records

Conducted patient interviews

Performed descriptive analysis

8 dentists and one dental technician

The # of dentists treated was 23-times higher than the # expected

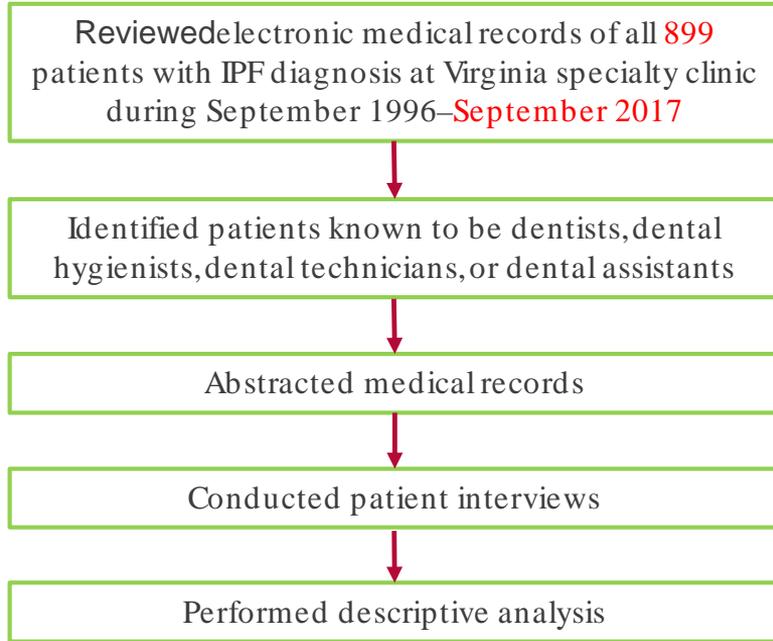
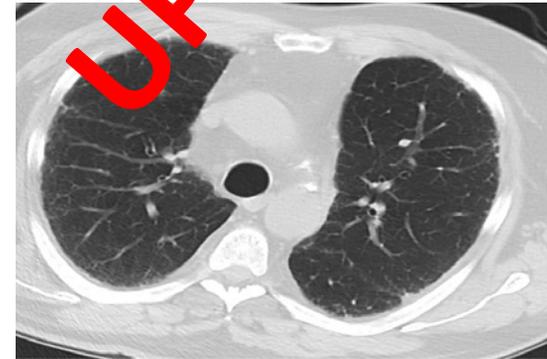
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10 dentists and one dental technician

The # of dentists treated was **29-times** higher than the # expected

Select Key Findings (n = 11 cases)

- Males = 11 (100%)
- Median age at diagnosis = 65 (range: 49–81) years
- Deceased = 7 (64%)
- Cigarette smoking = 5 (46%)
- Interviewed = 2
 - Polishing dental appliances, preparing amalgams and impressions, assisting or demonstrating denture placement using adhesives, developing x-rays, and using disinfectants/sterilants
 - **No personal protective equipment during 1960s–1980s**

Limitations

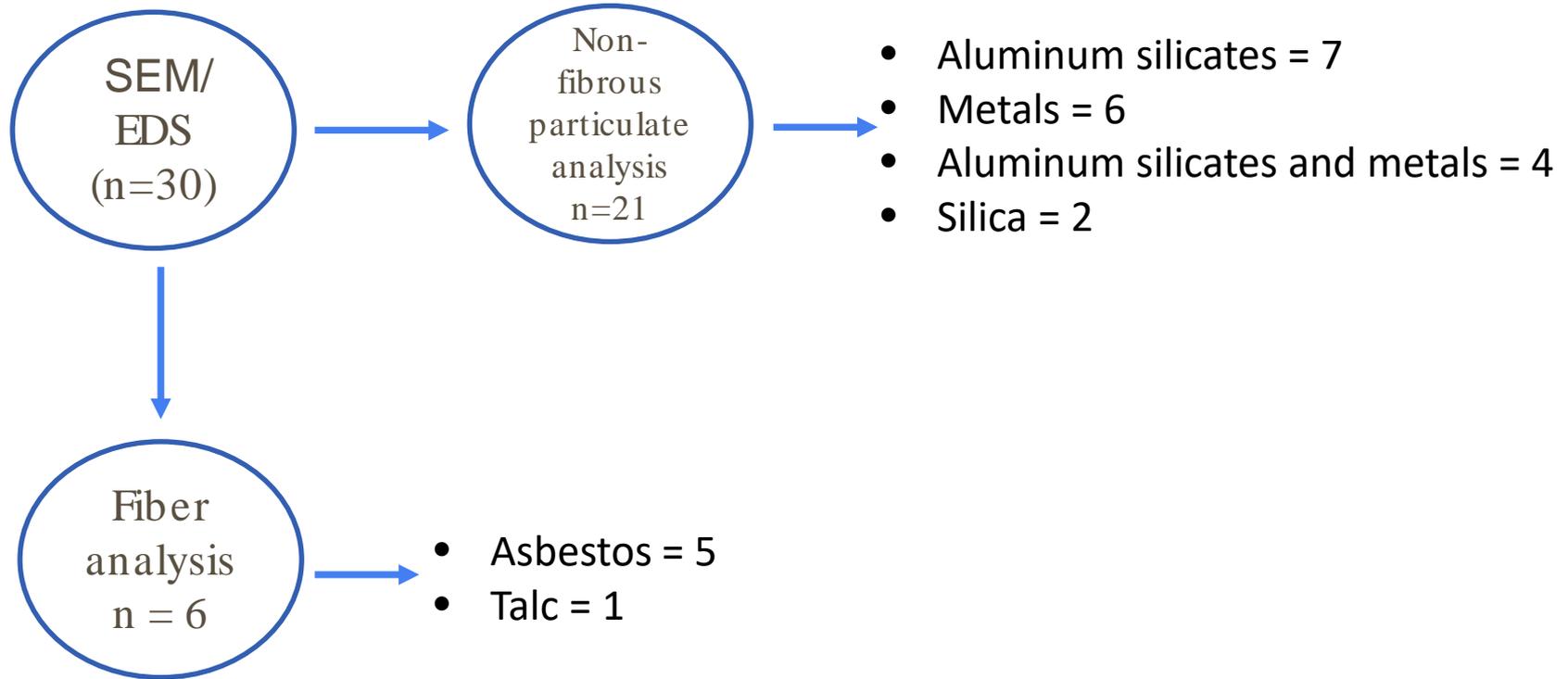
- Single tertiary care facility specializing in IPF
- Only two patients completed interviews
- Multiple patients reported exposures that occurred outside of work
- No biopsy specimens available

Proportionate mortality from 'other interstitial pulmonary diseases with fibrosis' by industry and occupation classification for select years, National Occupational Respiratory Mortality System

Industry/occupation classification	Diagnostic code*	Years	Number of decedents	Proportionate mortality ratio (95% CI)
Worked in office of dentists	J84.1	1999, 2003, 2004, 2007	35	1.52 (1.05–2.11)
Occupation of dentist	J84.1	1999, 2003, 2004, 2007	19	1.67 (1.01–2.61)

* *International Classification of Diseases, Tenth Revision* (ICD-10) code J84.1, 'other interstitial pulmonary diseases with fibrosis'

Are All Cases of IPF Truly “Idiopathic”?

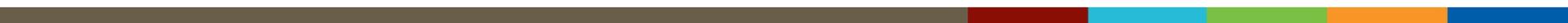


Dentistry-related exposures



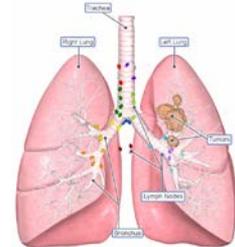
IPF

?



Other Respiratory Conditions

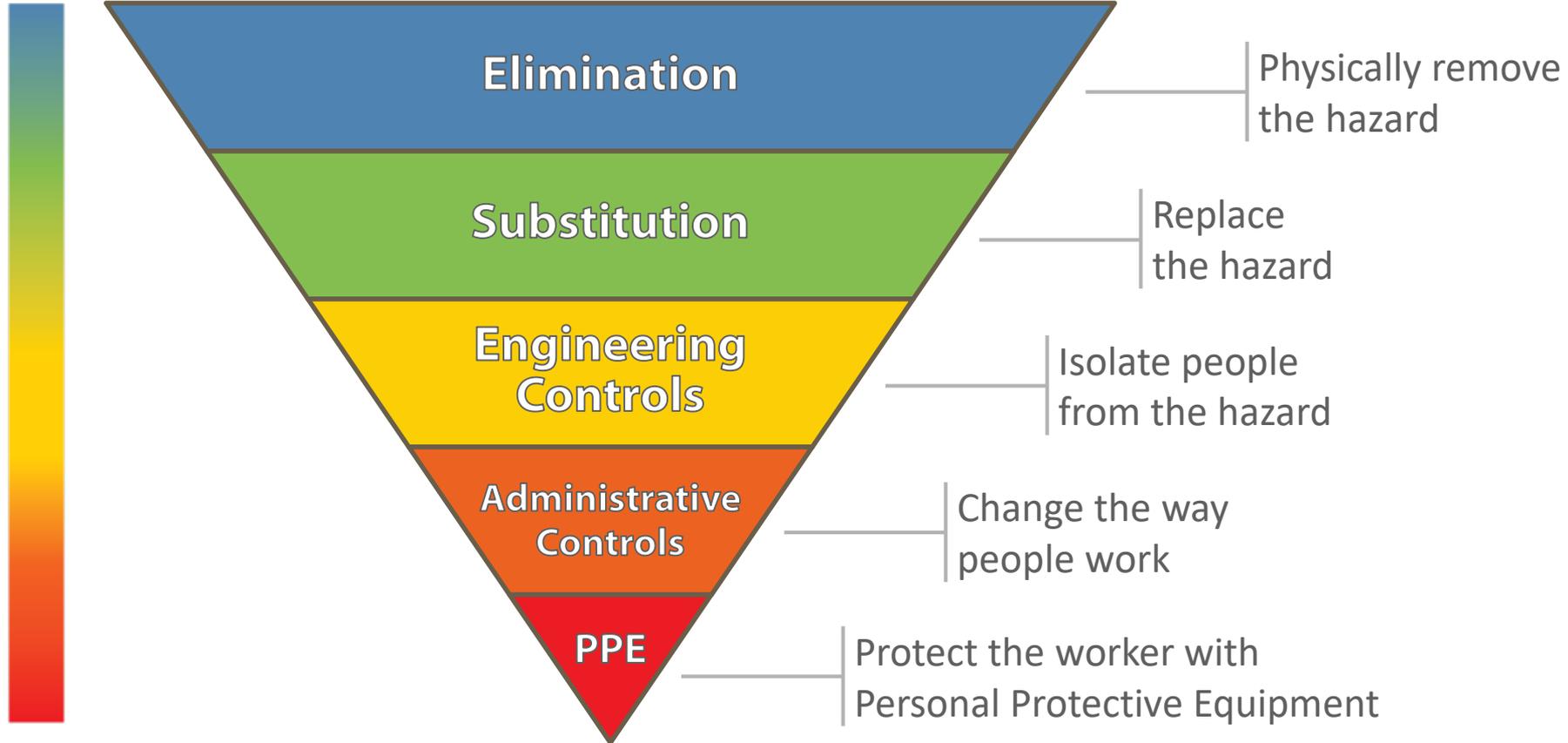
- Asthma
- Pneumoconioses
 - Asbestosis
 - Silicosis
 - Dental technician's pneumoconiosis
- Lung cancer



Reducing Occupational Hazards

Hierarchy of Controls

Most Effective



Least Effective

Surgical Masks Are Not Respirators!

- Physical barrier
- Protects against droplets
- Do not protect against:
 - Small particles
 - Gases
 - Vapors
 - Fumes

N95
2018
DAY

Understanding the Difference

	 Surgical Mask	 N95 Respirator
Testing and Approval	Cleared by the U.S. Food and Drug Administration (FDA)	Evaluated, tested, and approved by NIOSH as per the requirements in 42 CFR Part 84
Intended Use and Purpose	Fluid resistant and provides the wearer protection against large droplets, splashes, or sprays of bodily or other hazardous fluids. Protects the patient from the wearer's respiratory emissions.	Reduces wearer's exposure to particles including small particle aerosols and large droplets (only non-oil aerosols).
Face Seal Fit	Loose-fitting	Tight-fitting
Fit Testing Requirement	No	Yes
User Seal Check Requirement	No	Yes. Required each time the respirator is donned (put on)
Filtration	Does NOT provide the wearer with a reliable level of protection from inhaling smaller airborne particles and is not considered respiratory protection	Filters out at least 95% of airborne particles including large and small particles
Leakage	Leakage occurs around the edge of the mask when user inhales	When properly fitted and donned, minimal leakage occurs around edges of the respirator when user inhales
Use Limitations	Disposable. Discard after each patient encounter.	Ideally should be discarded after each patient encounter and after aerosol-generating procedures. It should also be discarded when it becomes damaged or deformed, no longer forms an effective seal to the face; becomes wet or visibly dirty; breathing becomes difficult; or if it becomes contaminated with blood, respiratory or nasal secretions, or other bodily fluids from patients.


Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health

The Right PPE Must Be Worn Correctly!





Promoting productive workplaces
through safety and health research



Health Hazard Evaluations (HHEs)

[en Español](#)



New HHE Report Available

A Law Enforcement Officer's Unintentional Occupational Exposure to Illicit Drugs

[Request an HHE](#)

[Find an HHE Report](#)

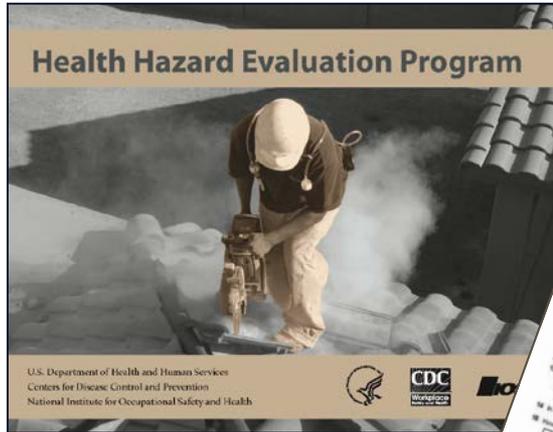
NIOSH Health Hazard Evaluations

- Worksite epidemiologic/industrial hygiene investigation in response to a request from employees, employers, or unions
- Determine whether harmful exposures, processes, or conditions exist OR cause injuries or illnesses
- Involve employees at every step
- No cost to the employer or employees
- Public final report

NIOSH Health Hazard Evaluations

- Can be requested by:
 - 3 current employees (can be confidential)
 - Union
 - Employer
- Requests for technical assistance
 - Other government agencies
 - State and local health departments

How are Health Hazard Evaluations (HHEs) Requested?



A tilted image of a 'Request for Health Hazard Evaluation (HHE)' form. The form is titled 'U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES' and 'Centers for Disease Control and Prevention'. It includes a 'CDC A-Z INDEX' at the top right. The form contains several numbered sections for providing information about the workplace, the specific hazard, and the request for an evaluation. It includes checkboxes for 'Yes' and 'No' responses and fields for names and titles. The form is titled 'Request for Health Hazard Evaluation (HHE)' and includes a 'CDC A-Z INDEX' at the top right.



By requesting a form by calling 513-841-4582

On the NIOSH HHE Website
<http://www.cdc.gov/niosh/hhe/request.html>

Information Gaps

- Prevalence of morbidity and mortality
- Dental assistants and dental hygienists
- Current work-related exposures
- Associations between inhalational exposures and respiratory health outcomes

Planned future studies

- Health
 - Expanded case-series
 - Tissue analysis
 - Mortality study
- Exposure
 - Exposure assessment study
- Exposure-health study

Questions or comments?

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(304) 285-6255

For more information, contact CDC
1-800-CDC-INFO (232-4636)
TTY: 1-888-232-6348 www.cdc.gov

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

