Dentistry, Respiratory Hazards, and NIOSH

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Dental Personnel

- About 730,000 dental personnel in the United States

- Dentists: 153,500
- Dental hygienists: 207,900
- Dental assistants: 332,000
- Dental laboratory technicians: 37,110

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

Randall J. Nat, MD; Kristen J. Cummings, MD; Ilenea Cannetti; Jason Con-Gumer, PhD; Steven D. Nathan, MD

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 as 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 63.9 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
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
Reviewed electronic medical records of all 899 patients with IPF diagnosis at Virginia specialty clinic during September 1996–September 2017

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

Abstracted medical records

Conducted patient interviews

Performed descriptive analysis

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

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

* International Classification of Diseases, Tenth Revision (ICD-10) code J84.1, ‘other interstitial pulmonary diseases with fibrosis’
Are All Cases of IPF Truly “Idiopathic”?

SEM/EDS (n=30)

- Asbestos = 5
- Talc = 1

Non-fibrous particulate analysis (n=21)

- Aluminum silicates = 7
- Metals = 6
- Aluminum silicates and metals = 4
- Silica = 2

Fiber analysis (n = 6)

- Asbestos = 5
- Talc = 1

Zhao Z, Abraham JL [2012]. Poster presented at the 2012 United States and Canadian Academy
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

Elimination
- Physically remove the hazard

Substitution
- Replace the hazard

Engineering Controls
- Isolate people from the hazard

Administrative Controls
- Change the way people work

Least Effective

PPE
- Protect the worker with Personal Protective Equipment

https://www.cdc.gov/niosh/topics/hierarchy
Surgical Masks Are Not Respirators!

- Physical barrier
- Protects against droplets
- Do not protect against:
  - Small particles
  - Gases
  - Vapors
  - Fumes
The Right PPE Must Be Worn Correctly!
Health Hazard Evaluations (HHEs)

en Español

New HHE Report Available
A Law Enforcement Officer's Unintentional Occupational Exposure to Illicit Drugs
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?

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