PL-2-01 Stephen Levin (Abridged presentation)

Health Effects among World Trade Center Responders

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Abstract

Workers and volunteers involved in rescue and recovery efforts at or near the WTC (World Trade Center) site had potential exposures to: 1) a range of environmental toxins, including pulverized cement and glass, asbestos, fiberglass, and other respirable and larger particulate matter – much of it highly alkaline – as well as lead and other heavy metals, PCBs, dibenzofurans, volatile organic compounds and other products of combustion; 2) psychological trauma; and 3) physical hazards including fire, collapsing buildings, falling debris, noise and extremes of temperature. Because of early clinical evidence of occupational illness among workers and volunteers who responded to the 9/11 WTC disaster, The National Institute for Occupational Safety and Health (NIOSH) funded the WTC Worker and Volunteer Medical Screening Program. The primary goal of the program was to develop and implement rapidly a clinical program to provide over 11,000 free standardized exams to WTC responders.

Retrospective review of records from a sample of 250 of the first 500 participants was conducted. Eighty-eight percent reported at least one WTC-related upper respiratory symptom and 78% reported having had at least one WTC-related pulmonary symptom while at the site. Ten months or more after September 11, 2001, 73% had either upper airway symptoms or an abnormal nasal examination or both, and 57% had either pulmonary symptoms or abnormal spirometry or both. Fifty-two percent reported mental health symptoms requiring further evaluation; 21% of the sample reported symptoms consistent with Post Traumatic Stress Disorder. Updated data on health effects will be presented.

A December 2001 study by the New York City Department of Health and the Agency for Toxic Substances and Disease Registry found that 13% of residential dust samples contained greater than 1% asbestos by weight. As much as 4% asbestos by weight has been found in other samples of surface dust. The implications of these data regarding future risk to human health and public health policy will be discussed.

The following is a selection from the authors' PowerPoint presentation. Relatively few (6 from 16) pictures have been included, but the bullet points are shown in their entirety.

Photographs of 9/11 aftermath

WTC Health Effects

- Collapse of towers and other buildings nearby pulverized concrete and other construction materials
- Much of the asbestos was fragmented into short structures
- **The exposure mix (partial list)**
  - Pulverized cement, gypsum
  - Pulverized glass
  - Asbestos
  - Silica
  - Fibrous glass
  - Heavy metals
  - Soot
  - Volatile organic compounds
  - Acid mists
  - Organic products of combustion (PAHs, etc.)
- **Main populations at risk**
  - Those caught in the collapse "cloud"
  - Ground Zero workers/volunteers in rescue/recovery
  - Service restoration workers at and near Ground Zero
  - Debris removal workers and support services
  - Building clean-up workers
  - Office/commercial space/school reoccupants
  - Community residents
- **Clinical experience (over 400 patients)**
- **Acute irritant effects**
  - **Upper airway inflammation**
    - Rhinitis/sinusitis
    - Pharyngitis
    - Laryngitis/tracheitis
    - Reactive upper airway dysfunction
  - **Bronchitis**
  - **Reactive airway disease (RADS)/Asthma**
- **Those with pre-existing sinusitis, asthma at greatest risk**

- **Particular issue of "provocability" of symptoms by cold air or airborne irritants**
  - Tobacco smoke
  - Vehicle exhaust
  - Cleaning solutions

- **Psychological effects**
  - Fear of personal harm
  - Exposure to widespread human trauma
  - No ability to exert control
  - Witnesses to aftermath
    - Many rescue and recovery workers lost family and friends in collapse
    - Few survivors rescued
    - Many had contact with human remains
    - Reactions exacerbated by fatigue, sleep deprivation for many

- **Musculoskeletal injuries**
  - Unstable, hazardous physical environment
  - Concern about acute injury, with longer-term musculoskeletal sequelae
  - Actual acute trauma rate remarkably low

WTC Worker and Volunteer Medical Screening Program

- **Funded by NIOSH to rapidly establish a clinical program to provide 12,000 free standardized screening exams to WTC responders (NYC, NY/NJ, nationally)**

- **Examination purposes**
  - To identify current WTC-related physical and mental health problems and refer for care
  - To serve as baseline for future exams
  - To develop a scientific understanding of the health effects of WTC exposures

- **Program Goals**
  - To identify workers/volunteers with persistent WTC-related medical conditions
  - To coordinate referral for follow-up medical care for affected individuals
  - To educate exposed workers and volunteers about their exposures and the associated risks to health.
  - To advise individuals about benefit and entitlement programs available

- **Who Were Examined?** (N=11,456)
  - Construction (2800+)
  - Law enforcement (1800+)
  - Technical and Utilities (600+)
  - Public sector- blue collar (500+)
  - Transportation (300+)
  - Cleaning/Maintenance (200+)
  - Ironworkers (200+)

Screening Program
Findings Among 1,138 Examinees

- **Exposure**
  - Present in Lower Manhattan (south of Canal Street)
    - at any time of day on 9/11/01 46%
    - Among those present:
      - Directly in the cloud of dust from the collapse of the towers 51%
      - Exposed to significant amounts of dust but not directly in the cloud 31%
      - Exposed to some dust only 14%
      - Not exposed to dust 4%
  - Began work at Ground Zero 9/11 through 9/14 84%
  - Used full or half-face respirator 9/11 - 9/14 21%

- 60% reported developing cough, chest tightness, shortness of breath or wheezing (lower respiratory symptoms) during WTC efforts
- Lower respiratory symptoms persisted to time of examination in 40% of group (on average, 8 months after 9/11/01)
- 74% reported sinus, nasal, ear or throat (upper respiratory) symptoms during WTC efforts
- Upper respiratory symptoms persisted to time of examination in 50% of group
- Also found high rates of new acid reflux symptoms (GERDS) – 15%
- 33% of group had abnormal breathing tests
- 31% of never-smokers had PFT abnormalities
- Only 23% of examinees reported receiving medical care for respiratory symptoms before screening exam
- Over half of examinees had persistent symptoms of psychological distress severe enough to warrant further evaluation by a mental health professional
- PTSD, depression the most common problems

Unmet Public Health Needs

- **What might have helped?**
  - MD advisory ASAP to orient treating physicians
  - Immediate capture of registry info for volunteers, workers
  - Rapid distribution of appropriate respiratory protection
  - Rapid mobilization of resources for medical evaluation/treatment – respiratory, psychological
  - Testing of indoor settings to establish a gradient of exposure with distance from Ground Zero to guide recommendations
  - Settled dust
  - Aggressive air monitoring
  - Advisories on handling office, residential materials (e.g. rugs, sofas, files)
  - Advisories on estimates of risk, especially for asbestos-related cancer
  - More focus on acute effects, less on cancer
  - More attention to human health experience, rather than exclusive focus on air monitoring

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