FDNY

14,000 Fire & EMS Workers
Proudly Serving New York and the USA

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- Co-Director FDNY WTC Medical Programs

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Pre-Plan

After Action Lessons

Learned, Forgotten or Ignored?

Good Plan --> Seamless

Poor Planning &/or Execution

Prolonged Misery
TOO EARLY
ON TIME OR TOO LATE

WRONG OUTCOME

BUSH SUCKS
Where is FEMA!

LEFT BEHIND
TOO LATE & DISORGANIZED
On 9/11/01:

- >20,000 Civilians Evacuated
- 2749 Deaths
- The Most Successful Evacuation in History
- Full Spectrum of Injuries: Trauma -> Respiratory Failure
From a Healthcare Perspective, What do **ALL** Disasters Have in Common?

- Initial Acute Trauma
- Triage & Treatment
- Public Health Response
- Environmental Exposures
- Displaced Persons:
  - Shelter Medicine
  - Clean Water
  - Sanitation
  - Infection
- Acute & Chronic Illness?
- Respite for Local Medical Staff?
- If Needed, Organized Healthcare Deployment From Outside the Area
- Medical Screening?
- Medical Monitoring?
- Medical Treatment?
- Mental Health Treatment?
The Physician Role in Disaster Medicine

COMMUNICATION
Understand Your Changing Roles:

- ICS Coordinates Initial Public Message
- Liaison
- Advise
- Additional Public & Private Messages
- Patient / Public Health Advocate
- Evaluate & Treat
- Transition to Recovery
- Stress the Positive, the Negative or Both?
First Responders ➔ Respond On-duty or Off-duty Career or Volunteer With or Without Respirators or other PPE

People not Buildings are the Victims
This is **NOT** the type of respiratory protection that first responders should wear at a FIRE or HAZMAT event. Exposures were INEVITABLE.
On day 1 when working, mask type worn & frequency

SCBA: 9%
Half Face Resp: 7%
Dust Mask: 70%
N95 Medical: 14%

Mostly Worn: 18%
Rarely Worn: 26%
None Worn: 56%

On wk 2 when working, mask type worn & frequency

MMWR Sept 2002
THIS IS WHAT WE INHALED ON THE FIRST DAYS AND OVER THE NEXT WEEKS

• AND PERSISTENT FIRE CLOUDS ADDED TO THE INHALATION EXPOSURE
WTC DUST = Particulate Matter
The Major Toxin is Dust:

- PULVERIZED CONCRETE
- FIBROUS GLASS & SILICATES
- CARBON PARTICULATES
- ASBESTOS
- ALKALINE pH
FDNY Firefighter Dust-Induced Inflammation
Induced Sputum – 10 months later

Fireman, Prezant, etal. Environmental Health Perspectives: In Revisions
FDNY Firefighter with Pneumonitis
BAL Lavage Dust Particles

Uncoated asbestos fiber  Degraded fibrous glass  Fly ash particle

Event:
- Fire
- Hazmat
- Rescue
- Recovery
- Medical
- Criminal
- Terrorist
- Secondary Events

Environment
- Thermal, N,B,C
- Interior or Exterior
- Day or Night
- Summer or Winter
- Land, Below grade
- Sea or Air

Host Data
- Age
- Training
- Gender
- Experience
- Health
- Fatigue
- Fitness
- Unit Issues

First Responder

Micro-Environment
- PPE Use

Goal is to Improve Outcomes:
- Wellness
- Injury
  - Burn
  - Trauma
- Illness
  - CardioPulm
  - Stress
  - Infectious
- Reduce Deaths

Post-Event
- Rehab
- Rescue
- Medical

Chief Medical Officers
Drs. Kelly & Prezant
- Protocol Development
- Sub-Specialty Evals.
- Research
- Respond to Major Injuries
- Liaison, Counseling, Treatment

Host Data

Train Injury Gender Illness Model Health Fatigue Fitness Unit Issues

Goal is to Improve Outcomes:

Wellness
Injury
- Burn
- Trauma
Illness
- CardioPulm
- Stress
- Infectious
Reduce Deaths

Post-Event
- Rehab
- Rescue
- Medical
• BASELINE AND FOLLOW-UP WTC MEDICAL MONITORING & TREATMENT IS ON-GOING

• WHAT HAVE WE LEARNED FROM THE FDNY WTC MEDICAL MONITORING & TREATMENT PROGRAMS
FDNY WTC MEDICALS

• CANNOT DO TIMELY POST-DISASTER MEDICAL MONITORING WITHOUT PRE-EXISTING INFRASTRUCTURE
FDNY WTC MEDICALS

- IN 1996, FDNY, IAFF & 9 OTHER CITIES COLLABORATED IN A JOINT LABOR-MANAGEMENT INITIATIVE FOR MEDICAL MONITORING WELLNESS-FITNESS PROGRAMS

- FDNY USED THIS INFRASTRUCTURE FOR POST-WTC & POST-KATRINA MEDICAL EVALUATIONS
COMPONENTS OF FDNY WTC MEDICAL:

- Questionnaires
  - Exposure, Medical & Stress
- Physician Evaluation
- PFT – Spirometry for everyone
  - Met hacholine Challenge for selected groups
- Chest Radiographs for everyone
  - Chest CT for selected groups
- Bloods/Urine Bio-Monitoring
- ECG & Audiometry
FDNY WTC MEDICALS

- October 2001 to Marc 02:
  - 11,000 medicals done
    - FDNY:
      - Firefighters
      - Officers EMS

  By 1/2006 = 13,700

Coupled with Aggressive Medical & Mental Health Treatment Programs
343 FDNY FATALITIES
14,000 FDNY SURVIVORS
1636+, Arriving At WTC During The AM Of The Collapse
6958+, Arriving At WTC Over The Next 48 Hours
1320+, Arriving At WTC The Next Week
A Few Hundred Arriving Thereafter
In Partnership with CDC & NIOSH (n=400; October):

- Hydrocarbons
- Antimony
- Dioxin & PCB Congeners
- Slight Elevations in Above
  - None Clinically Elevated
  - Most Normal compared to
    - FDNY FIREFIGHTER CONTROLS
• Total Serum PCBs
  – Electrical Eqpt. & Food
  – USA: 0 to 6 PPB = normal
– WTC
  • Avg < 6 PPB
  • 480 / 10,000 (5%) > 6 PPB
  • 36 > 12 PPB
FDNY WTC MEDICALS

• Heavy Metals
  – Serum Lead
    • 25 mcg/dl
    • 7 / 10,000 above limit
  – Urine Mercury
    • 35 mcg/g creatinine
    • 1 / 10,000 above limit
  – Urine Beryllium
    • 1 or 2 mcg/liter
    • 1 / 10,000 above limit
FDNY WTC MEDICALS

- ACCURATE ANALYSIS REQUIRES PRE EXPOSURE COMPARISONS
This was a carefully selected healthy workforce pre WTC with new, persistent symptoms post WTC
FDNY WTC MEDICALS

Chest X-ray: PA view

- Compared to pre-WTC Chest Films
  - Comparison to Baselines
  - Reduce Unneeded Workups

- Less than 30 of 9,000 were abnormal and these were in the symptomatic group
FDNY PFT from MEDICALS
Pre-WTC vs. 1-year Post-WTC

FDNY Cohort
(n=11,766 exposed with acceptable quality pre- & post-PFT), with or without symptoms, adjusted for exposure

Post-WTC PFT was at the lower limits of normal

Would not have appreciated the problem without having Pre-WTC PFTs for comparison
FDNY PFT from MEDICALS
Pre-WTC vs. 1-year Post-WTC

Entire FDNY Cohort, With or Without Symptoms, Adjusted for Exposure
• Arrival Time:
  • Early (High Exp.)
    • AM of Collapse
  • Intermediate
    • Next 44 hrs
  • Late (Low Exp.)
    • After First 48 hrs

Adjusted FEV1 Loss During The First Year After 09/11/2001 By Arrival Time Exposure Category

Adjusted FEV1 Loss (ml)

Arrival Time Exposure Category
FDNY PFT from MEDICALS
Pre-WTC vs. 1-year Post-WTC

Percent Predicted FEV1 Values Before and After 09/11/2001 - Full FDNY Cohort

Percent of Cohort

Before 09/11/2001
After 09/11/2001

Percent Predicted FEV1
Abnormal Result is a 20% or Greater Fall in Airflow Indicating Reactivity or Potential for an Asthma Attack
1 Month  3 Month  6 Month  Control

Hyperreactive
Subjects

PC20 <

Highly Exposed
Moderately Exposed
Control

n=19/77  n=21/76
n=19/76  n=19/80
n=2/25  n=3/44
n=3/36
n=1/28

1 month  3 month  6 month

Time-point When Measured After 9/11/01

Banauch, Kelly, Weiden, Prezant et al. ARRCM Sept. 2003
• IMPROVED OUTCOMES WILL OCCUR IF COUPLE MONITORING WITH TREATMENT
“WTC COUGH”

- The Most Symptomatic Required:
- Medical Leave $\geq 4$ wk
- Over 2,000 needed major Rx
- Over 600 filed disability retirement
- To date, over 420 permanent disability
WTC COUGH PATIENTS - PFTS

Prezant et al. NEJM 2002
CHEST IMAGING IN “WTC COUGH PATIENTS”

1. CHEST FILMS
   - NORMAL IN NEARLY ALL CASES
   - CHEST CT SCANS (n=500)
     - Confirmed above chest film results
     - Normal Inspiratory Views
       - Expiratory Views Showed Airway Inflammation
         - Bronchial Wall Thickening, Air Trapping
INSPIRATORY IMAGING

McGinness, Prezant et al
Rare Findings in this 14,000 FDNY Cohort

- 2 with new onset Eosinophilic Pneumonitis completely reversed with treatment
- 3 with new onset Progressive Pulmonary Fibrosis
  - 1 Fatality
- 1 with Mesothelioma - Fatal
- 20 with new onset Sarcoidosis
  - A 3 to 5 fold increased incidence rate for FDNY
  - All stable, some resolved
• COUGH, SINUS CONGESTION, ACID REFLUX
• EXERTIONAL SHORTNESS OF BREATH
  WTC DUST CAUSED
• REDUCTIONS IN PULMONARY FUNCTION
• AIRWAYS INFLAMMATION
• Many Cases of ASTHMA or RADS
• Rare Cases of Pneumonitis
• Major Health Concerns
FDNY HEALTH CONCERNS

Persons Who Worried About Their Health
By Exposure Group (0-1 yr exam)

Persons Who Feel Their Future May Be Cut Short
By Exposure Groups (1-2 yr exam)
5 Most Common Mental Health Symptoms Reported

- Difficulty Getting Good Night's Sleep: 48%
- Unusual Irritability: 36%
- Difficulty Concentrating: 34%
- Anxious or unusually restless: 33%
- Difficulty Falling Asleep: 32%
FDNY WTC Priorities:

LONG-TRM MEDICAL MONITORING & TREATMENT PROGRAM

9/11 WTC Exposures

Mental Health

Respiratory

Late Emerging Diseases (ex. Cancer)
THANK YOU