Personal Protection and Airborne Pathogens

Bioterrorism and Tuberculosis

New Situation

- Fatal illness
- Unsure mode of transmission
- Identifiable group
- Health-care workers at Risk
- Fear
- Lack of accepted tools
- Stigmatized group
- Refusal of care

Early 1990s

- TB incidence increases
- MDR-TB major concern
- 10% of new cases were HCWs - NYC
- Intense discussion on infection control.
- Re-discovery of airborne infection control

2003

- Unusual disease incidence detected by GIPHN in china.
- Heightened surveillance.
- SARS recognized.
- Mode of transmission unclear- Airborne.?
- Intense discussion on infection control.

The Future- Preparedness

- A intentional biological “event” occurs
- Possible differences in “expected” transmission
- Health-care workers on the front lines
- How do we protect ourselves?

Objectives

- Discuss basic concepts regarding airborne transmission.
- Review respiratory protection concepts.
- Briefly list requirements for a respiratory protection program.

Microbial Particle Sizing

- Viruses - < 1 micorn
- Bacteria usually > 1 micron
- Fungi usually greater than > 10 micrions

Particle Sizes of Concern

PARTICLES FROM INFECTIOUS PATIENTS > 1 MICRON

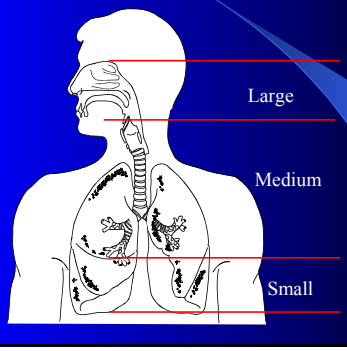
PARTICLES DISTRIBUTED IN BIOLOGICAL ATTACK MAY BE < 1 MICRON

Airborne Transmission

Droplet versus Droplet nuclei

- DROPLET
  - Larger particle
  - "Heavy" in room air
  - 6 feet general range
  - Filtered in the upper respiratory tract
  - Examples, Pertussis, Pneumonic plague, typical smallpox
- DROPLET NUCLEI
  - Small and respirable (1-5 microns)
  - Stay airborne
  - Respirable to lower lung
  - Examples, Tuberculosis, Measles, and some cases of Smallpox

The human filter



Decisions. . . Decisions

- Do your employees need protection?
- If yes, how to select?
- Where will it be used?
- When will it be used?
- By whom?
- When and how often to train employees?

Some Requirements for a **Program**

- Written formal program
- Administered by qualified person(s)
- Selection of respirator based on hazard
- Use NIOSH certified respirators
- Medical screening/evaluation
- Fit Testing
- Fit Checks
- Storage/ Use/ Disposal

Elements of a Respiratory Program

Selection
Medical evaluation
Fit testing
Use
Maintenance and care
Breathing air quality and use
Training
Program evaluation

Respiratory Protection Information

www.osha.gov

- Look for online respirator selection tool.
- Look online for 29 CFR 1910.134

NIOSH – Respirator selection guideline

Masks and Respirators

- Surgical mask
- N95
- N100

} Negative Pressure – Filtering Face Piece

- Powered Air Purifying Respirator (PAPR)
- Atmosphere-Supplying Respirator
  - Self Contained Breathing Apparatus (SCBA)
  - Supplied-Air Respirator (SAR)

N95

N100

PAPR

Training

- Where and when is respirator used
- What the respirator does
- Limitations of respirator
- How to fit check
- Maintenance storage and cleaning
- Disposal
- Indications that respirator should NOT be used

Medical Evaluation

- Medical screening and evaluation
  - May use tool in OSHA standard
  - Screening may be done a licensed HCW
- Determine if it is feasible and safe

Fit Testing

Determines appropriate size

Qualitative

Quantitative

User Seal Check (fit check)

- Required each time respirator is donned
- Follow manufacturer instructions
- Determines if the user has correctly put on and adjusted the respirator.

Maintenance and Care

- Provide each user with a respirator that is clean, sanitary and in good working order
- Clean and disinfect at the following intervals:
  - as often as necessary when issued for exclusive use
  - before being worn by different individuals when issued to more than one employee
  - after each use for emergency respirators and those used in fit testing and training
- Address Storage!

Program Evaluation

- Must conduct evaluations of the workplace as necessary to ensure effective implementation of the program
- Must regularly consult employees required to use respirators to assess their views on program effectiveness and to identify and correct any problems
  - factors to be assessed include, but are not limited to:
    - respirator fit (including effect on workplace performance)
    - appropriate selection
    - proper use
    - proper maintenance

Records

- Records of medical evaluations must be retained and made available
- A record of fit tests must be established and retained until the next fit test is administered
- A written copy of the current program must be retained
- Written materials required to be retained must be made available upon request to affected employees and OSHA

Preparedness Prevents Problems

- Learn from the past (HIV)
- Take lessons from the present (TB)
- Apply to the future (new disease, BT)
- Add ingredients and stir as necessary (Revise protocols when better information is available)