RESPIRATORY PROTECTION FROM AIRBORNE INFECTIOUS AGENTS

Use of N-95 Disposable Particulate Respirators

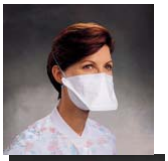
TRAINING OBJECTIVES

- **Explain what N-95 disposable particulate respirators are and why they are recommended**
- **Discuss their capabilities and limitations**
- **Demonstrate proper use**
- **Describe the proper maintenance and storage of N-95 respirators**

WHY USE A RESPIRATOR?

- To protect you from infectious microorganisms, such as Influenza, tuberculosis, SARS
- As a supplement to engineering controls, such as barriers between you and the patient, and proper ventilation
- As a supplement to administrative controls, such as distance, and early identification and separation of ill patients
- Preferred methods of controls are engineering and administrative controls
- Respirators are the last line of defense when no other means of protection is sufficient to limit exposure

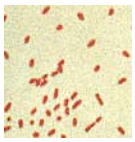
What is an N-95 disposable particulate respirator?



- Filtering facepiece or air-purifying respirators
- Negative pressure respirator - when inhaling, the pressure inside the respirator is less than outside the respirator
- One of 9 types of filter classes
- Over 300 different models of N-95 respirators approved by NIOSH

Why is an N-95 disposable particulate respirator recommended?

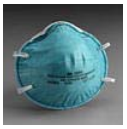
- **Protects by filtering out infectious particles from the air that you breathe**
- **Protects public health workers on the front lines if a respiratory hazard is present**



What does "N-95" mean?

- The respirator is made with N-series filter material that is at least 95% efficient in removing particles of 0.3 microns
  - N= Not resistant to oils (industrial)

N-95 Disposable Particulate Respirators with or without an Exhalation Valve



- **May have or not have an exhalation valve. An exhalation valve can:**
  - **reduce breathing resistance**
  - **reduce moisture buildup inside the respirator**
  - **increase work tolerance and comfort**
- Respirator with an exhalation valve DO NOT protect others from possible contamination by the respirator wearer.

Advantages of N-95 Disposable Particulate Respirators

- Lightweight compared to elastomeric
- Fairly comfortable to wear for short periods
- Mobility not restricted
- Disposable, low cost
- Available in various sizes
- Do not require cleaning

Limitations of N-95 Disposable Particulate Respirators

- **Don't protect skin or eyes from contact with pathogens**
  - if the airborne infectious agent is also spread by skin or mucous membrane contact, also use eye protection, gloves and consider gown
- **May not protect from high concentrations of pathogens**
  - higher levels of respiratory protection may be required

Limitations of N-95 Disposable Particulate Respirators

- **Don't protect from oxygen deficiency or harmful chemical gases and vapors**
- **Do not protect workers from high levels of very toxic dusts, like asbestos or lead**

- **REMEMBER: N-95 respirators must be NIOSH approved and fit tested! N-95s used as medical devices must also be approved by the FDA.**

Is an N-95 disposable respirator the same as a surgical mask?

NO! A typical surgical mask is not a respirator.

Because some disposable N-95 respirators resemble surgical masks, it is important to understand the difference between them.

Is an N-95 disposable respirator the same as a surgical mask?

- **Surgical masks are designed to protect the patient from your secretions.**
- **Most surgical masks do not adequately remove small particles from the air and do NOT prevent leakage around the edge of the mask when the user inhales.**

BUT.....

- **A surgical mask on a PATIENT helps to prevent the spread of respiratory secretions.**

OSHA's Respiratory Standard

- **If N-95 respirators are issued, employers must follow OSHA standard (1910.134)**
  - **Written respiratory program with an assigned program administrator**
  - **Proper selection of respirators**
  - **Annual training about hazards and proper use**
  - **Medical clearance**
  - **Annual Fit testing**
    - **Evaluation of program effectiveness annually**

Proper Use of N-95 Disposable Respirators

- **Review manufacturer's instructions for proper donning (putting on), seal check, removal and use.**
- **No facial hair that interferes with face to facepiece seal**
- **If shape of the N-95 is compromised, it may not fit properly**
- **If respirator is damaged, soiled or breathing becomes difficult, leave the contaminated area and replace the respirator**
- **Dispose after each use in regular trash**

Medical Clearance

- **N-95 use requires medical evaluation and clearance before use.**
- **Medical evaluation may use a confidential questionnaire that is reviewed by a licensed health care professional (LHCP)**
- **Evaluation is repeated if a change occurs that might affect ability to use a respirator safely.**
- **Medical provider sends written clearance to employer stating that employee can or cannot wear a specific respirator.**

Fit Testing

- **OSHA requires fit testing prior to initial use and annually thereafter.**
- **You will be fitted to a specific model/size.**
- **You must be re-fitted for a different model/size**
- **If a respirator does not form a tight seal around the face, contaminated air may leak around the edges of the face seal.**
- **The only way to determine if a respirator fits and is capable of protecting properly is to fit-test the respirator.**

Quantitative Fit Testing

- **Computerized means of detecting face seal leakage**
- **A PORTACOUNT measures particles inside the respirator and compares to particles in the room**
- **A number value is determined to measure how well the respirator fits the individual**

Qualitative Fit Testing

- **Simple “pass” or “fail” test.**
- **Relies on the wearer's subjective response to tasting or smelling the test agent**
  - **If the subject can taste or smell the substance the fit is not acceptable - “fail”**
  - **If the subject can not taste or smell the substance during the test - “pass”**
    - **Test agent is usually saccharin (sweet) or Bitrex (bitter).**

Fit Testing Precautions

- User must put the respirator on themselves without the help of the trainer
- If user can not be fit tested after 2 attempts move on to another make, model or size
- Tester should never manipulate the respirator to obtain a fit, rather they should instruct the wearer what to do so they can perform it themselves
- Never make special modifications to the respirator, e.g. tying a not in the straps, to make it fit
- Do not pinch a metal nose piece. Start with 2 index fingers touching each other at the middle of the nose piece and work outward on the bridge while pressing

Respiratory Protection Effectiveness

- Employer must evaluate program annually
- Must select the correct respirator
- Must be available when needed
- Must know when and how to put on/take off
- Must store and maintain per manufacturer's instructions

Key Points About Using N95

• Put on BEFORE contact with the patient, generally before entering the room

•After use, avoid touching the outside of the device to help prevent contamination of the hands

• Remove and discard either at the doorway or immediately outside patient room

- Immediately perform hand hygiene

PUTTING ON THE N-95 Respirator

•Select model and size that FIT-TESTED you
•Make sure the respirator is clean, undamaged and the straps have elasticity

•Place over nose, mouth and chin
•Fit flexible nose piece over nose bridge
•Secure on head with elastic
•Adjust to fit
•Perform a user seal check:
- Inhale - respirator should collapse
- Exhale - check for leakage around face

How to Perform a Seal Check

- **Follow manufacturers instructions**
- **Typically the wearer holds both hands over the mask to block off as much air as possible and then exhales, looking and feeling for leads around the edge of the respirator, e.g. forehead hair movement, fogging of glasses**

Removing a Particulate Respirator

- Remove PPE in sequence:
  - gloves
  - face shield
  - goggles
  - gown
  - respirator

What if there is a shortage of N-95s?

•N-95 respirators are designed for single use
•In times of shortage:

- Consider covering the respirator with a surgical mask and discarding the surgical mask after use and reusing the respirator:
  - A face shield may be worn over a respirator to protect it from contamination and allow it to be reused after properly cleaned
  - Ensure that the respirator retains its ability to fit and function properly

In Times of Short Supply

- **Decision to reuse an N-95 is made by the Respiratory Protection Program Administrator**
- **Decision is based on the available supply and current epidemiological data**
- **Decision must be clearly communicated to staff**
- Never reuse an N-95 that has been obviously soiled or damaged, creased or torn, wet or dirty with secretions

Storing N-95s

• Supplies should be placed in clean, secure, temperature-controlled environments to prevent damage or contamination
•Avoid storage areas that are damp or have temperature extremes
•Use oldest supplies first

For additional information on respirators….

•http://www.cdc.gov/niosh/npptl/respirators/respsars.html

• http://www.cdc.gov/niosh/99-143.html

•http://www.cdc.gov/niosh/topics/respirators