How Elastomeric Respirators and PAPRs Can Better Protect Healthcare Workers During COVID-19

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Industrial Hygienist
MDC Consulting and Training
Columbia, Maryland

American Federation of Teachers (AFT)
Labor-Management Webinar Series
Wednesday, July 22, 2020, 3:00 – 4:30 pm ET
TYPES OF RESPIRATORY PROTECTION

Elastomeric Half Facepiece Respirators are reusable and have replaceable cartridges or filters. They cover the nose and mouth and provide protection against gases, vapors, or particles when equipped with the appropriate cartridge or filter.

Elastomeric Full Facepiece Respirators are reusable and have replaceable canisters, cartridges, or filters. The facepiece covers the face and eyes, which offers eye protection.

Filtering Facepiece Respirators are disposable half facepiece respirators that filter out particles such as dusts, mists, and fumes. They do NOT provide protection against gases and vapors.

Powered Air-Purifying Respirators (PAPRs) have a battery-powered blower that pulls air through attached filters, canisters, or cartridges. They provide protection against gases, vapors, or particles, when equipped with the appropriate cartridge, canister, or filter. Loose-fitting PAPRs do not require fit testing and can be used with facial hair.

Supplied-Air Respirators are connected to a separate source that supplies clean compressed air through a hose. They can be lightweight and used while working for long hours in environments not immediately dangerous to life and health (IDLH).

Self-Contained Breathing Apparatus (SCBAs) are used for entry into or escape from environments considered to be IDLH. They contain their own breathing air supply and can be either open circuit or closed circuit.

Combination Respirators can be either a supplied-air/SCBA respirator or supplied-air/air-purifying respirator. The SCBA type has a self-contained air supply if primary airline fails and can be used in IDLH environments. The air-purifying type offers protection using both a supplied-air hose & an air-purifying component and cannot be used for entry into IDLH environments.
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Reusable Respirators for Healthcare

**Elastomeric Half Facepiece Respirator**
- Reusable facepiece and replaceable cartridges or filters
- Can be used to protect against gases, vapors, or particles, if equipped with the appropriate cartridge or filter
- Covers the nose and mouth
- Fit testing required

**Powered Air-Purifying Respirator (PAPR)**
- Reusable components and replaceable filters or cartridges
- Can be used to protect against gases, vapors, or particles, if equipped with the appropriate cartridge, canister, or filter
- Battery-powered with blower that pulls air through attached filters or cartridges
- Provides eye protection
- Low breathing resistance
- Loose-fitting PAPR does NOT require fit testing and can be used with facial hair
- Tight-fitting PAPR requires fit testing
Occupational Health and Infectious Disease History, 1990s

First NIOSH Recommended Guidelines for Personal Respiratory Protection of Workers in Health-Care facilities Potentially Exposed to Tuberculosis (PAPRs and Supplied-air Respirators)


- OSHA issues Bloodborne Pathogens standard
- Healthcare Unions petitioned OSHA in 1986 for standard
- Coalition to Fight TB in the Workplace (14 Unions) petitions OSHA for standard
- OSHA initiates TB rulemaking in January 1994
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NIOSH Recommended Guidelines

for

Personal Respiratory Protection

of Workers in Health-Care Facilities

Potentially Exposed to Tuberculosis

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Centers for Disease Control
National Institute for Occupational Safety and Health
Atlanta, Georgia

September 14, 1992
1992 - First NIOSH Recommendations for Respirators to Protect Healthcare Workers from Tuberculosis

- Powered Air-Purifying Respirators with HEPA Filters (now called P100)
- Positive-Pressure Supplied-Air-Line Half Mask Respirator
Occupational Health and Infectious Disease History, 1990s

First NIOSH Recommended Guidelines for Personal Respiratory Protection of Workers in Health-Care facilities Potentially Exposed to Tuberculosis (PAPRs and Supplied-air Respirators)

NIOSH approves disposable particulate respirator (N95) use at Health-Care facilities for Tuberculosis


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National Academies Of Sciences Reports

2018

Reusuable Elastomeric Respirators in Health Care
Considerations for Routine and Surge Use

2015

The Use and Effectiveness of Powered Air Purifying RESPIRATORS in Health Care
WORKSHOP SUMMARY

INSTITUTE OF MEDICINE
OF THE NATIONAL ACADEMIES
Successful Use for 30 years by the Texas Center for Infectious Disease (TCID)

Elastomeric Respirators

- The current Elastomeric Respirator TCID institutes:
  - North 7700 - S, M, L
    - 134 Employees
  - Moldex – S, M, L
    - 2 Employees
  - Powered Air Purifying Respirators
    - 2 Employees

TCID is a 75-bed specialty public hospital in San Antonio, currently the only freestanding inpatient TB treatment facility in the United States
Elastomeric Respirators in Healthcare: Lessons learned and adaptation for COVID-19

NIEHS Worker Training Program
April 15, 2020

Stella E Hines, MD, MSPH
Divisions of Occupational & Environmental Medicine and Pulmonary & Critical Care Medicine
shines@som.umaryland.edu
The Allegheny Health Network Recently Began Adopting Elastomeric Respirators With Involvement of SEIU Healthcare Pennsylvania
Half Facepiece Elastomeric Respirators
<table>
<thead>
<tr>
<th></th>
<th>Elastomeric Respirators</th>
<th>N95s</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Employer compliance with OSHA requirements necessary</strong></td>
<td><strong>Currently poor compliance by many healthcare employers</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Fit testing</strong></td>
<td>Reliable – can use all OSHA approved methods &amp; test agents</td>
<td>Reliable ?</td>
</tr>
<tr>
<td><strong>User Seal Check</strong></td>
<td>User can be reliably trained to do &amp; user can readily perform during work</td>
<td>Difficult for user to perform reliably</td>
</tr>
<tr>
<td><strong>Assigned Protection Factor</strong></td>
<td>10</td>
<td>10 *</td>
</tr>
<tr>
<td></td>
<td>*previously 5</td>
<td></td>
</tr>
<tr>
<td><strong>Filter</strong></td>
<td>N95, but more protective N100, R100 and P100 available</td>
<td>N95</td>
</tr>
<tr>
<td><strong>Cost</strong></td>
<td>$20 – 50 each, including filters For several month to one year</td>
<td>$0.50 – 4 each For single use / extended and reuse during crisis</td>
</tr>
</tbody>
</table>
Selection of filter efficiency (i.e., 95%, 99%, or 99.97%)

Higher filter efficiency means lower filter leakage

<table>
<thead>
<tr>
<th>Minimum Filter Efficiency</th>
<th>N series</th>
<th>R Series</th>
<th>P Series</th>
</tr>
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<tbody>
<tr>
<td>95%</td>
<td>N95</td>
<td>R95</td>
<td>P95</td>
</tr>
<tr>
<td>99%</td>
<td>N99</td>
<td>R99</td>
<td>P99</td>
</tr>
<tr>
<td>100% (99.97%)</td>
<td>N100</td>
<td>R100</td>
<td>P100 (~HEPA)</td>
</tr>
</tbody>
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Half Facepiece Elastomeric Respirators
Filter Selection

Avoid filter with no covers
Powered Air-Purifying Respirators

- The fan draws air in through the filter
- Clean air is delivered through the breathing hose to the headpiece
Powered Air-Purifying Respirators
New design
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<th>N95s</th>
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<tr>
<td><strong>Fit testing for Tight-fitting models only</strong></td>
<td>Employer compliance with OSHA requirements necessary</td>
<td>Currently poor compliance by many healthcare employers</td>
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<tr>
<td><strong>Reliable – can use all OSHA approved methods &amp; test agents</strong></td>
<td></td>
<td>Reliable ?</td>
</tr>
<tr>
<td><strong>Loose-fitting models</strong></td>
<td>No fit testing required, can be worn with facial hair</td>
<td>No facial hair which interferes with seal</td>
</tr>
<tr>
<td><strong>Assigned Protection Factor</strong></td>
<td>25</td>
<td>10 *</td>
</tr>
<tr>
<td></td>
<td>*previously 5</td>
<td></td>
</tr>
<tr>
<td><strong>Filter</strong></td>
<td>P100</td>
<td>N95</td>
</tr>
<tr>
<td><strong>Cost</strong></td>
<td>$600 – 1200, including filters, batteries and all parts Reuse for year or more</td>
<td>$0.50 – 4 each For single use / extended and reuse during crisis</td>
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OSHA Respirator Standard – Program Elements

(a) Permissible practice
(b) Definitions
(c) Respirator program
(d) Selection of respirators
(e) Medical evaluation
(f) Fit testing
(g) Use of respirators
(h) Maintenance and care
(i) Breathing air quality and use
(j) Identification of filters, cartridges, and canisters
(k) Training and information
(l) Program evaluation
(m) Recordkeeping
(n) Dates
(o) Appendices (mandatory)
   A: Fit Testing Procedures
   B-1: User Seal Checks
   B-2: Cleaning Procedures
   C: Medical Questionnaire
   D: Information for Employees Wearing Respirators When Not Required Under the Standard
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Respirator Program Elements

Medical evaluation
- OSHA Medical Questionnaire (mandatory)
Respirator Program Elements

Fit testing
- Fit Testing Procedures, for tight fitting models
- User Seal Checks, for tight fitting models
Respirator Program Elements

Cleaning and Disinfecting Procedures – between patients

- By wearers using disinfectant wipes
Respirator Program Elements

Cleaning and Disinfecting Procedures – between patients
- By trained wearers using disinfectant wipes

Cleaning and Disinfecting Procedures – between shifts
- By trained wearers – decentralized system, with support and oversight
- By Central Processing
Respirator Program Elements

Storage & Availability Options

• Central vs. individual responsibility
  – TCID – backpacks (NASEM 2018)
  – WorkSafe BC (Ciconte & Danyluk, 2013)
    • Failed because dedicated staff had not been identified to transport respirators to/from units to cleaning area

• Take home:
  – Central cache: identify staff in advance, assure job duties
  – Individual maintenance: Provide means of readiness (bag)
SEIU Healthcare Pennsylvania
Experience with the Allegheny Health Network
Recently Began Adopting Elastomeric Respirators

Michelle Boyle, RN, BSN
Chapter Vice President at Allegheny General Hospital, SEIU Healthcare Pennsylvania, and Nurse Member Coordinator of Nurse Alliance of Healthcare Pennsylvania
SEIU Healthcare Pennsylvania
Experience with the Allegheny Health Network
Recently Began Adopting Elastomeric Respirators

1. Please give us a short introduction your Local, AHN and your COVID-19 experience?

2. Tell about AHN adopting elastomeric respirators – When, why? What type? Where are they being use?

3. What has been the response from your members using elastomerics? Have any staff / union members been infected and or died of COVID?

4. How did management roll this out? How has your union and members been involved?

5. What has gone well and what would you do differently (or might be changing)? I'll follow up with these, if you don't cover ...
   • How is fit testing done?
   • How is cleaning and disinfecting done?
   • Staff are provided their own respirator, correct? How are they stored between shifts

6. Will AHN continue using the elastomerics after this pandemic?

7. Any other info / advice for union leaders / managers considering adopting elastomeric respirators?
Glad to follow-up with additional information and resources and to assist with possible pilot projects

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