Respiratory Protection in Long Term Health Care and Primary Care

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Why Do We Need Respirators

- When people breathe, talk, sing, cough, or sneeze moist warm droplets are emitted
- The droplets are of various sizes
- The droplets quickly lose water and become smaller
- Droplets of up to 100 microns may remain airborne long enough to be inhaled
- Influenza receptors are located throughout the respiratory tract
- Respirators, but not surgical masks, seal to the face and force air to pass through filtering media
When are LTCF and Clinics required to use respirators

• During initial visit, when an Airborne Infectious Disease (AirID) suspected or confirmed case is not using source control
  – Unless respirator use is not feasible
• If the patient is not referred (e.g. H1N1 patient kept in SNF)
• If high hazard procedures are performed on AirID patients
  – As of September 1, 2010 higher levels of protection are required for high hazard procedures

Respirators and Surgical Masks
Respirators vs. Surgical Masks

Protection provided by device without fit-testing

<table>
<thead>
<tr>
<th>Type of Device</th>
<th>5th percentile protection*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elastomeric respirator</td>
<td>7.3</td>
</tr>
<tr>
<td>Filtering Facepiece N95</td>
<td>3.3</td>
</tr>
<tr>
<td>Surgical mask</td>
<td>1.2</td>
</tr>
</tbody>
</table>

*protection is outside concentration/inside concentration

Robert B. Lawrence, Matthew G. Duling, Catherine A. Calvert and Christopher C. Coffey, 'Comparison of Performance of Three Different Types of Respiratory Protection Devices', JOEH 3:9, 465 - 474

Multiple Surgical Masks

Current H1N1 Recommendations

- Health care workers caring for H1N1 patients should use fit-tested N95 respirators or more effective respirators. (September 2009)
- CDC continues to recommend the use of respiratory protection that is at least as protective as a fit-tested disposable N95 respirator for healthcare personnel who are in close contact with patients with suspected or confirmed 2009 H1N1 influenza. (October 2009)

Respirator Basics

- Respirator use in health care is regulated by Section 5199 and Section 5144 (federal 29 CFR 1910.134)
- Requirements
  - Reduction of hazard with engineering and administrative controls
  - Written program and designated administrator
  - Hazard assessment
  - Selection of appropriate, NIOSH approved respirators
Respirator Basics (cont)

- Medical Evaluation
- Fit-testing (initial and periodic)
- User procedures including seal check, cartridge change, and procedures for IDLH
- Procedures for storage, maintenance, cleaning and disinfection
- Training
- Record Keeping
- Program evaluation including employee involvement

Air Purifying Respirators

- Air purifying respirators remove contaminants from the air being inhaled by the user
  - Conventional APR has negative pressure in the facepiece, and is tight-fitting (generally)
  - Powered APR may have positive pressure, and may be a hood, helmet, or tight-fitting facepiece
N95 Respirators

Elastomeric Facepieces
Powered Air-Purifying Respirators (PAPR)

Atmosphere Supplying Respirators

- Provide their own source of air (compressor, air tank, or portable air tank)
- Can be positive or (rarely) negative pressure
- Can be tight-fitting facepiece, or hood or helmet
- Generally do not filter air being exhaled
### SCBA

![SCBA Image](image)

<table>
<thead>
<tr>
<th>Respirator Type</th>
<th>OSHAAssigned Protection Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filtering facepiece</td>
<td>10 (5 being considered by ANSI)</td>
</tr>
<tr>
<td>Half-facepiece elastomeric</td>
<td>10</td>
</tr>
<tr>
<td>Full facepiece elastomeric</td>
<td>50</td>
</tr>
<tr>
<td>PAPR with hood</td>
<td>25 or up to 1000 (if maintain + pressure)</td>
</tr>
<tr>
<td>PAPR with tight-fitting facepiece</td>
<td>1000</td>
</tr>
</tbody>
</table>
Medical Issues with Respirator Use

- Increased resistance to air flow
- Increased dead space volume
- Increased CO₂
- Heat effects, particularly if used in conjunction with other PPE
- Physical work, ergonomics – particularly with SCBA
- Claustrophobia
- Limits to communications

Medical Evaluations

- Medical Evaluation must have the content of the questionnaire in Section 5144, Appendix C
  - ATD standard permits the use of a shorter questionnaire in Section 5199, Appendix B
- Questionnaire is available on many websites
- Must be evaluated by a PLHCP (physician or other licensed health care professional) who can order additional tests
- A “yes” answer to any specified question requires “further evaluation”
- No interval is specified for re-evaluation – the PLHCP and employer should specify
Fit-testing

- The purpose of fit-testing is to ensure that a selected respirator will provide the required protection factor.
- Allowed fit-test methods are in Appendix A to Section 5144.
- Qualitative fit-tests use a challenge agent:
  - bitrex, saccharine, irritant smoke, or isoamyl acetate.
- Quantitative fit-tests measure leakage:
  - Generated aerosol, ambient aerosol, controlled negative pressure.

Qualitative Fit Test
Quantitative Fit Test

Do N95’s need to be fit-tested?

1996 NIOSH laboratory study of 25 subjects with 21 models of N95s found

• Without fit-testing, the average protection factor for all subjects using a respirator was 3.
• By selecting out bad fits, using a fit-test, the average protection factor was 25
• Only four models passed a fit-test for the majority of participants. Three did not pass the fit-test for any participant.

Effect of Fit-testing N95

<table>
<thead>
<tr>
<th>Type</th>
<th>Geometric mean without fit-test</th>
<th>5th %ile w/o /FT</th>
<th>5th %ile pass bitrex</th>
<th>5th %ile pass companion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filtering facepiece</td>
<td>20.4</td>
<td>3.3</td>
<td>7.9</td>
<td>20.5</td>
</tr>
</tbody>
</table>

Source: Robert B. Lawrence, Matthew G. Duling, Catherine A. Calvert and Christopher C. Coffey , 'Comparison of Performance of Three Different Types of Respiratory Protection Devices', JOEH 3:9, 465 - 474

Additional Fit Tests

- To be provided if employee requests additional fit test
- If employee has weight gain or loss, facial changes (such as surgery or dental work) that may effect fit
- At least annually
  - Exception in Section 5199 for non-high hazard, permits biennial until 1/1/2014
  - Must provide Appendix G info in alternate years
N95 User Procedures

• User seal check difficult to perform on filtering facepiece respirators
• Can not be used in atmospheres “immediately dangerous to life or health”
• Will not protect against gases or vapors, only particles (including mists)
• Change respirator (filtering facepiece) or cartridge when breathing becomes more difficult or if dirty, wet, etc.

What’s Wrong with this Picture?

• Respirators do not work if they do not seal to the face.
• Facial hair must not interfere with the seal.
• Straps must be directly seated on the head, in this case above and below the ear
N95 Maintenance, Storage, Inspection

- Every respirator should be inspected prior to putting it on, to make sure the straps are okay, it is not torn, deformed, dirty, etc.
- Generally filtering facepiece respirators used against infectious particles should be disposed each time they are removed.
- If shortage prevents disposal, employer should have storage and re-donning procedures, including procedures for handling respirator to prevent contamination.
- No respirator should be put on if it is torn, wet, dirty, or unable to form a facepiece seal.

Initial and Annual Training

Required training elements

- Why the respirator is necessary and how improper fit, usage, or maintenance can compromise respirator protective effect;
- Limitations and capabilities of the respirator;
- Emergency use and what to do if respirator malfunctions;
- How to inspect, put on and remove, use, and check the seals of the respirator;
- Maintenance and storage of the respirator;
- Medical signs and symptoms that may limit or prevent the effective use of respirators; and
- General requirements of regulation.
Program Review

- At least annual
- Consult with affected employees

Record Keeping

- Medical evaluations per 3204
- Most recent fit-test
- Appendix G to 5199
- Current respirator program made available

Find Cal/OSHA on the Web

- Advisory committee webpage:
  - http://www.dir.ca.gov/dosh/DoshReg/advisory_committee.html
- Respiratory protection regulation
  - http://www.dir.ca.gov/Title8/5144.html
- Respiratory Protection in the Workplace