

# Respiratory Protection in Long Term Health Care and Primary Care

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[www.dir.ca.gov/dosh](http://www.dir.ca.gov/dosh)

## 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

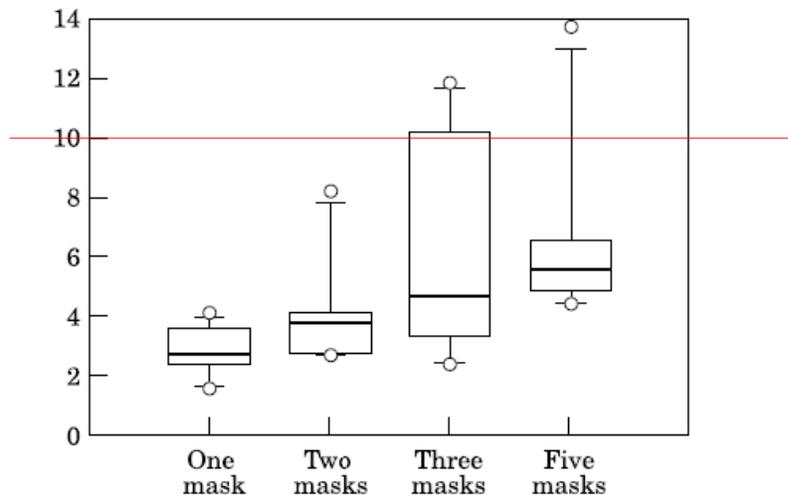
## Protection provided by device without fit-testing

Type of Device	5 <sup>th</sup> percentile protection*
Elastomeric respirator	7.3
Filtering Facepiece N95	3.3
Surgical mask	1.2

\*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



Derrick JL, Gomersall CD. Protecting healthcare staff from severe acute respiratory syndrome:filtration capacity of multiple surgical masks. In Journal of Hospital Infection (2005)59, 365-368.

## 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

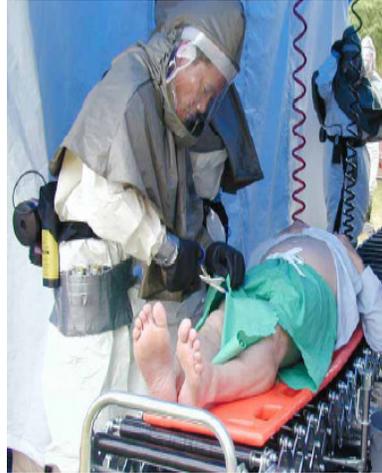
## N95 Respirators



## Elastomeric Facepieces



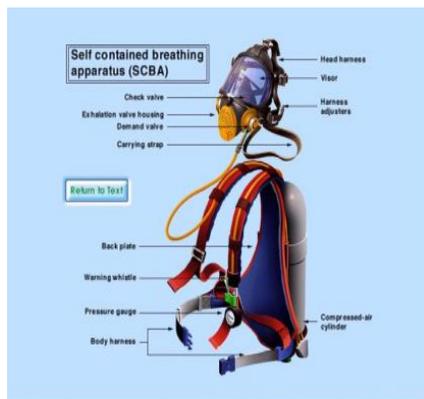
## Powered Air-Purifying Respirators (PAPR)



## 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



Respirator Type	OSHA Assigned Protection Factors
Filtering facepiece	10 (5 being considered by ANSI)
Half-facepiece elastomeric	10
Full facepiece elastomeric	50
PAPR with hood	25 or up to 1000 (if maintain + pressure)
PAPR with tight-fitting facepiece	1000

## Medical Issues with Respirator Use

- Increased resistance to air flow
- Increased dead space volume
- Increased CO<sub>2</sub>
- 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.

Laboratory Performance Evaluation of N95 Filtering Facepiece Respirators, 1996. MMWR Morb Mortal Wkly Rep. 1998 Dec 11;47(48):1045-9.

## Effect of Fit-testing N95

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

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](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
  - [http://www.dir.ca.gov/dosh/dosh\\_publications/respiratory.pdf](http://www.dir.ca.gov/dosh/dosh_publications/respiratory.pdf)