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

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

Mark Catlin
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MDC Consulting and Training
Columbia, Maryland

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.

CDC NIOSH
Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health

September 2019

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Example of an open-circuit SCBA

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Example of an SAR/SCBA

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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

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

NIOSH Recommended Guidelines

for

Personal Respiratory Protection

of Workers in Health-Care Facilities

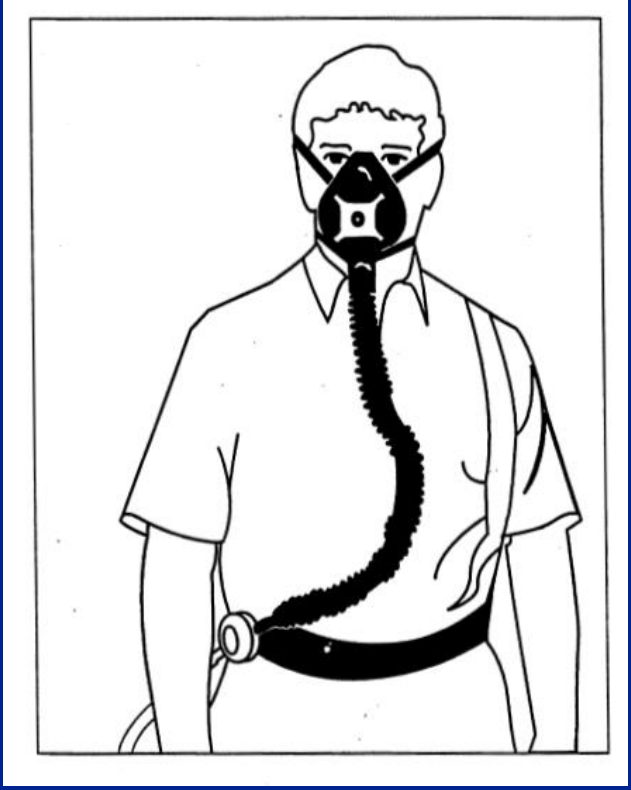
Potentially Exposed to Tuberculosis

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-AirAir-Line Half Mask Respirator

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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

1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999

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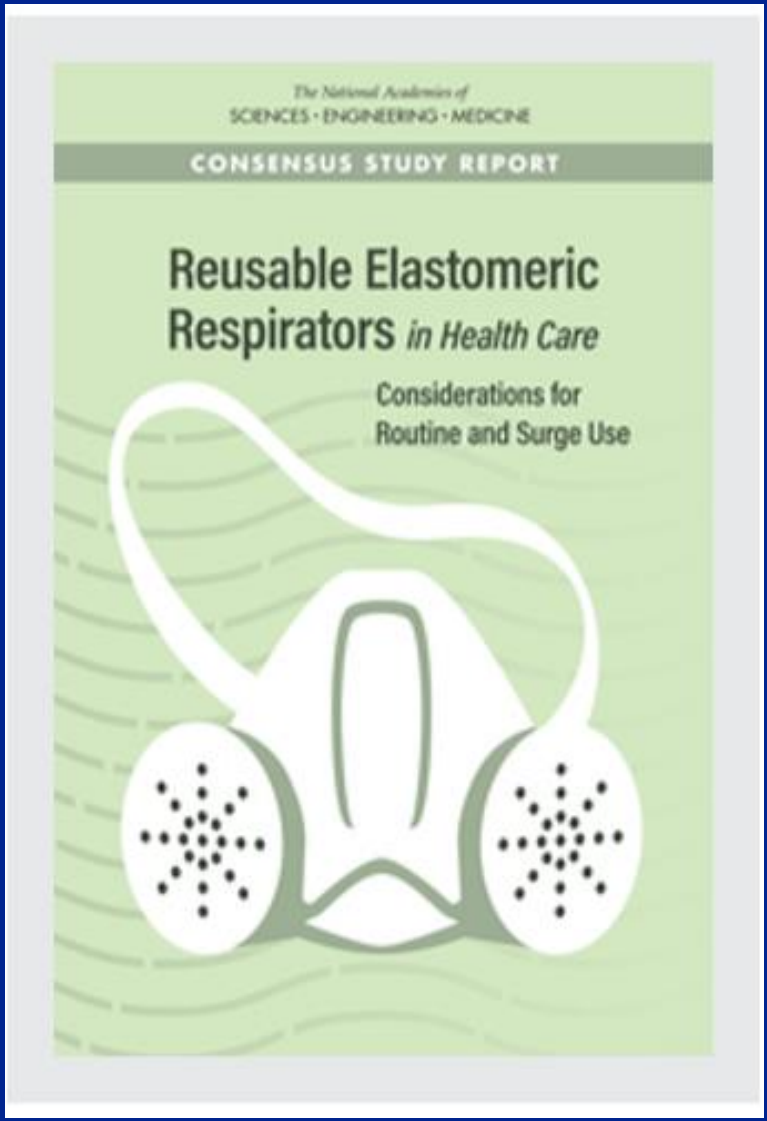
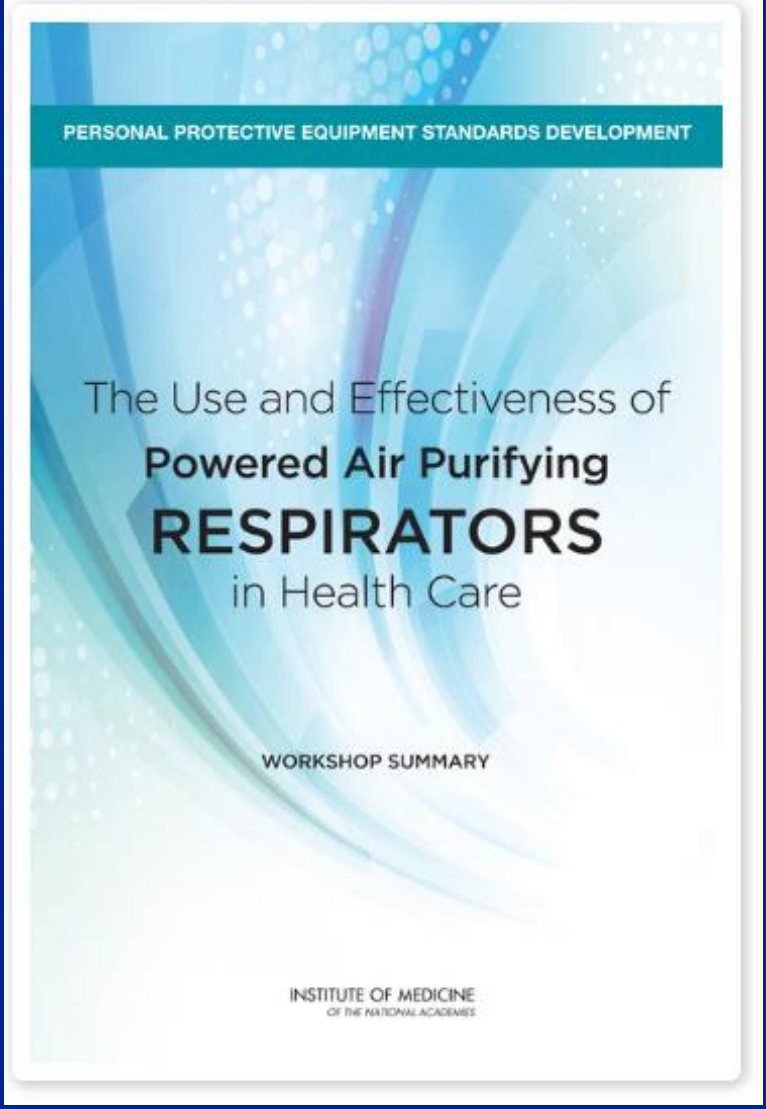
National Academies Of Sciences Reports



2018



2015

Successful Use for 30 years by the Texas Center for Infectious Disease (TCID)

TEXAS
Health and Human Services
Texas Department of State Health Services

Elastomeric Respirators

- The current Elastomeric Respirator TCID institutes:

North 7700 - S, M, L

134 Employees

Moldex – S, M, L

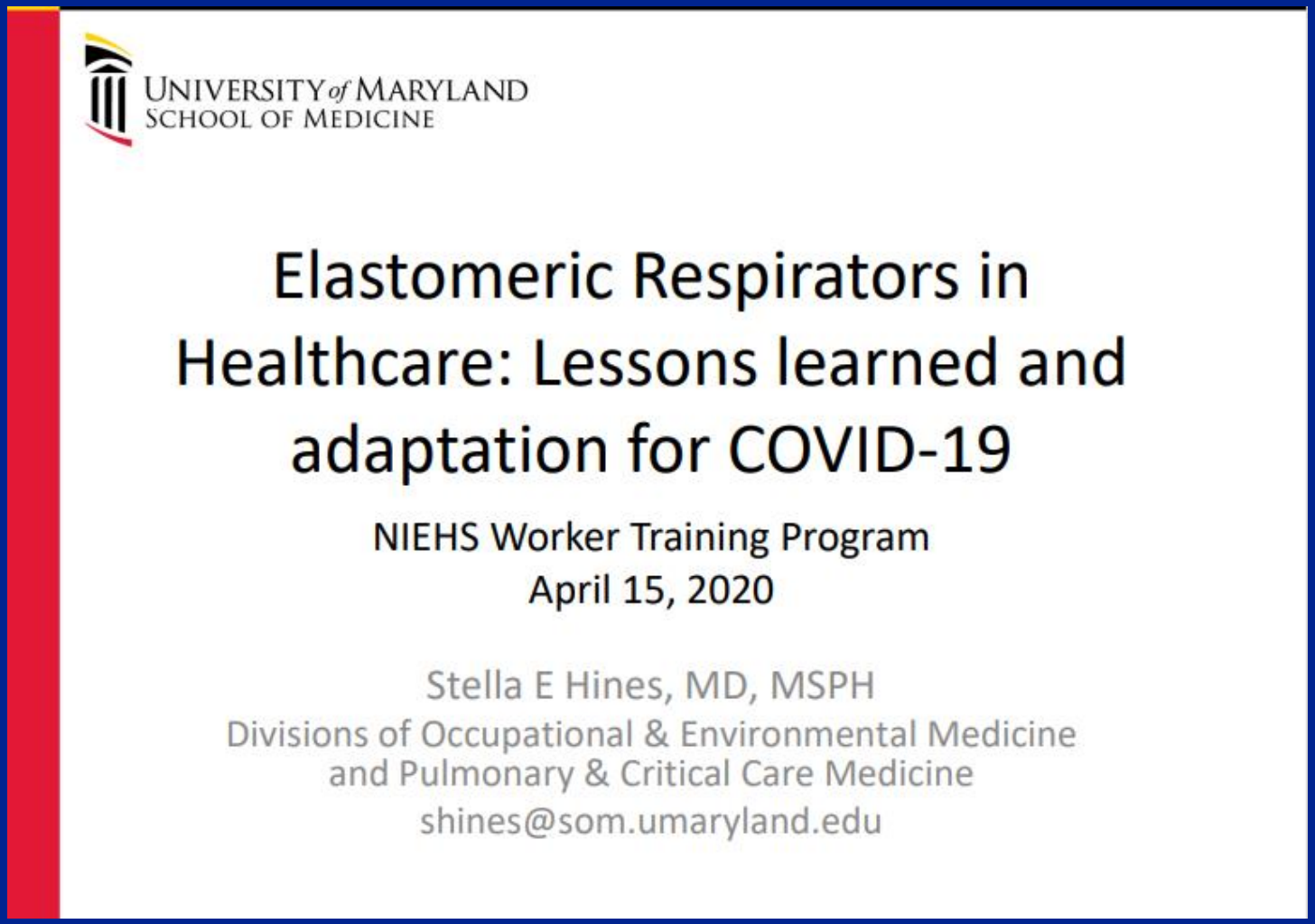
2 Employees

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

Successful Use by the University of Maryland Medical System for 10 years



The Allegheny Health Network Recently Began Adopting Elastomeric Respirators With Involvement of SEIU Healthcare Pennsylvania

PITTSBURGH.CBSLOCAL.COM

Coronavirus In Pittsburgh: AHN To Equip Caregivers With Industrial Grade Protective Masks

Allegheny Health Network

Home > News > AHN Partners with MSA Safety to Provide P100 Protective Masks to

NEWS

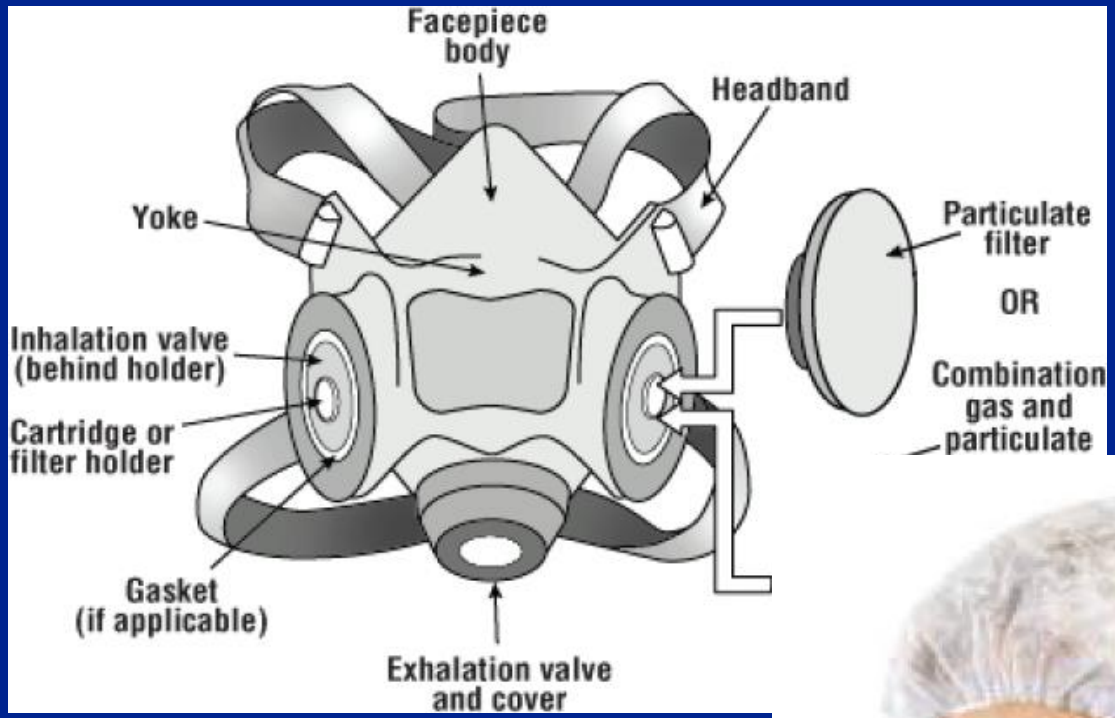
AHN Partners with MSA Safety to Provide P100 Protective Masks to Clinical Staff on Frontlines of COVID-19 Pandemic

Thursday, April 16, 2020

Industrial grade respirators can be used repeatedly, expected to significantly reduce disposable N95 mask usage across network

PITTSBURGH, PA — Allegheny Health Network (AHN) today announced another significant step in the organization's efforts to assure that frontline caregivers in its hospitals have the personal protective equipment they

Half Facepiece Elastomeric Respirators



	Elastomeric Respirators	N95s
	Employer compliance with OSHA requirements necessary	*Currently poor compliance by many healthcare employers*
Fit testing	Reliable – can use all OSHA approved methods & test agents	Reliable ?
User Seal Check	User can be reliably trained to do & user can readily perform during work	Difficult for user to perform reliably
Assigned Protection Factor	10	10 * *previously 5
Filter	N95, but more protective N100, R100 and P100 available	N95
Cost	$20 – 50 each, including filters For several month to one year	$0.50 – 4 each For single use / extended and reuse during crisis

NIOSH Particulate Filter Approval Categories

Minimum Filter Efficiency	N series Not resistant to oil	R Series Somewhat resistant to oil	P Series Strongly resistant to oil
95%	N95	R95	P95
99%	N99	R99	P99
100% (99.97%)	N100	R100	P100 (~HEPA)

Selection of filter efficiency (i.e., 95%, 99%, or 99.97%)

Higher filter efficiency means lower filter leakage

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

	Powered Air-Purifying Respirators	N95s
	Employer compliance with OSHA requirements necessary	*Currently poor compliance by many healthcare employers*
Fit testing for Tight-fitting models only	Reliable – can use all OSHA approved methods & test agents	Reliable ?
Loose-fitting models	No fit testing required, can be worn with facial hair	No facial hair which interferes with seal
Assigned Protection Factor	25	10 * *previously 5
Filter	P100	N95
Cost	$600 – 1200, including filters, batteries and all parts Reuse for year or more	$0.50 – 4 each For single use / extended and reuse during crisis

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)

RPP Appendix C: Medical Clearance Questionnaires

Appendix C to Sec. 1910.134: OSHA Respirator Medical Evaluation Questionnaire (Mandatory)

To the employer: Answers to questions in Section 1, and to question 9 in Section 2 of Part A, do not require a medical examination.

To the employee:

Your employer must allow you to answer the questionnaire during normal working hours, or at a time and place that is convenient to you. To maintain your confidentiality, your employer or supervisor must not look at or review your answers, and your employer must tell you how to deliver or send this questionnaire to the healthcare professional who will review it.

Part A Section 1. (Mandatory) The following information must be provided by every employee who has been selected to use any type of respirator (please print).

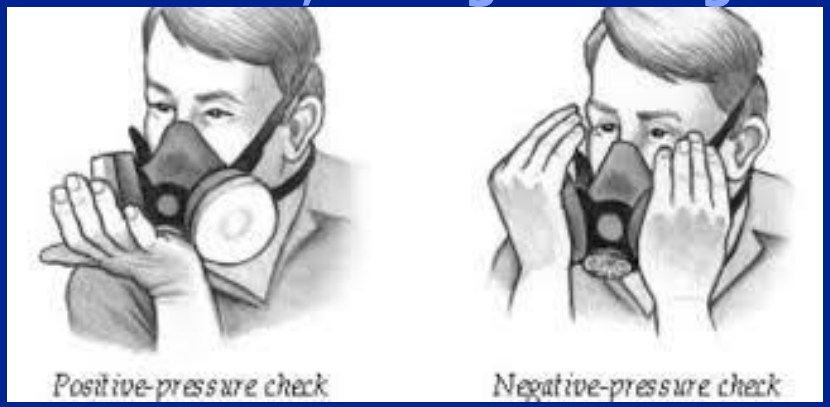
1. Today's date:
2. Your name:
3. Your age (to nearest year):
4. Sex (circle one): Male/Female
5. Your height: ft. in.
6. Your weight: lbs.
7. Your job title:

Respirator Program Elements

Fit testing

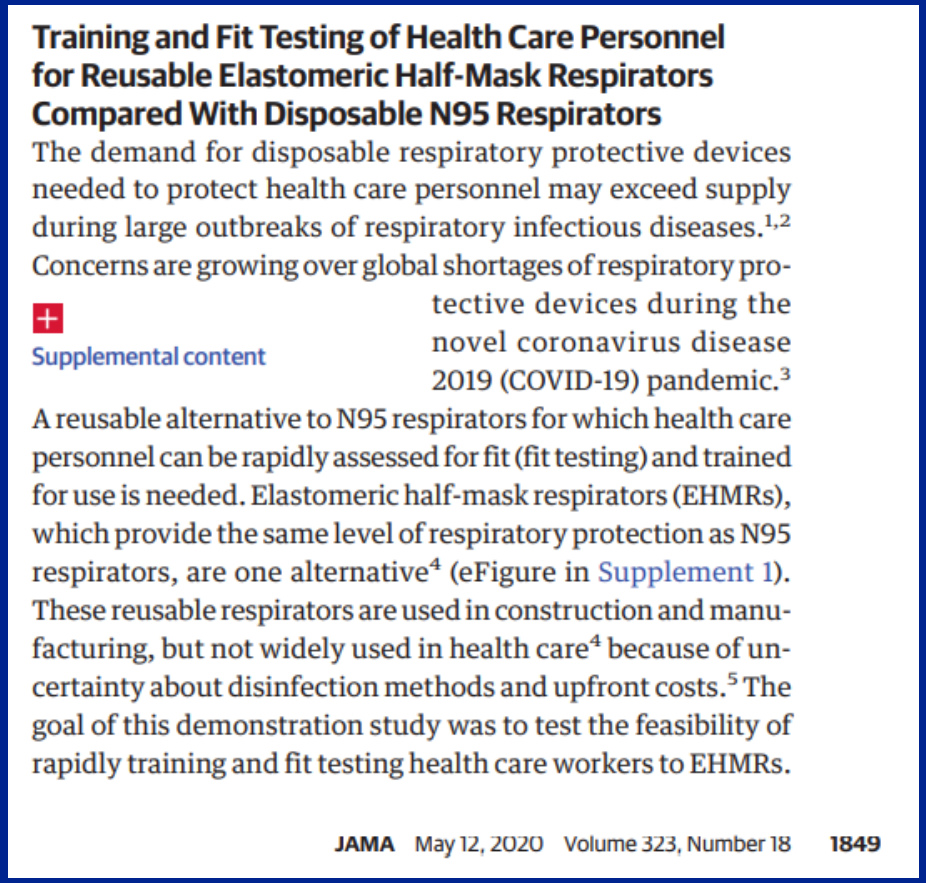
- **Fit Testing Procedures, for tight fitting models**

- User Seal Checks, for tight fitting models



Respirator Program Elements

Training and information



Training and Fit Testing of Health Care Personnel for Reusable Elastomeric Half-Mask Respirators Compared With Disposable N95 Respirators

The demand for disposable respiratory protective devices needed to protect health care personnel may exceed supply during large outbreaks of respiratory infectious diseases.[1,2] Concerns are growing over global shortages of respiratory protective devices during the novel coronavirus disease 2019 (COVID-19) pandemic.[3]

Supplemental content

A reusable alternative to N95 respirators for which health care personnel can be rapidly assessed for fit (fit testing) and trained for use is needed. Elastomeric half-mask respirators (EHMRs), which provide the same level of respiratory protection as N95 respirators, are one alternative[4] (eFigure in Supplement 1). These reusable respirators are used in construction and manufacturing, but not widely used in health care[4] because of uncertainty about disinfection methods and upfront costs.[5] The goal of this demonstration study was to test the feasibility of rapidly training and fit testing health care workers to EHMRs.

Pompeii LA, Kraft CS, Brownsword EA, et al. Training and Fit Testing of Health Care Personnel for Reusable Elastomeric Half-Mask Respirators Compared With Disposable N95 Respirators [published online ahead of print, 2020 Mar 25]. *JAMA*. 2020;323(18):1849-1852. doi:10.1001/jama.2020.4806

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

Contents lists available at ScienceDirect

American Journal of Infection Control

journal homepage: www.ajicjournal.org

Major article

Disinfection of reusable elastomeric respirators by health care workers: A feasibility study and development of standard operating procedures

Mary T. Bessesen MD [a,b,*], Jill C. Adams BSN [a], Lewis Radonovich MD [c,d], Judith Anderson MD [a]

[a] Department of Veterans Affairs, Eastern Colorado Healthcare System, Denver, CO
[b] Division of Infectious Diseases, School of Medicine, University of Colorado, Aurora, CO
[c] Department of Veterans Affairs, National Center for Occupational Health and Infection Control, Gainesville, FL
[d] Department of Veterans Affairs, National Center for Occupational Health and Infection Control, Washington, DC

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. Wil 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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