

FINAL REPORT

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Simulation Study: Does the Air Exhaled from a PAPR Wearer Contaminate the Sterile Field in an Operating Room?

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Introduction

Respiratory protection of healthcare workers is often attempted to be achieved through using conventional surgical masks which are neither defined as respiratory protective devices (RPDs) nor subjected to the NIOSH certification or fit testing. Furthermore, surgical masks have been overwhelmingly demonstrated to feature very low protection efficiency for a wearer (see, e.g., a series of studies conducted at the University of Cincinnati: Gao et al., 2016; Grinshpun et al., 2009; He et al., 2013; Lee et al., 2008; Willeke et al., 1996). A survey conducted in 2014 and supported by the Centers for Disease Control and Prevention (CDC) and the Association of Schools and Programs of Public Health (ASPPH) found that the NIOSH-certified N95 filtering facepiece respirators (FFRs) are the most widely deployed RPDs in healthcare environments followed by the Powered Air Purifying Respirators (PAPRs) (Wizner et al., 2016). The PAPRs are used by healthcare professionals in a variety of clinical settings, including operating rooms (ORs). It is acknowledged that PAPRs are also widely deployed at other workplaces, beyond healthcare settings.

A PAPR uses a blower to force air through filters which remove contaminants before supplying air to the wearer. The PAPRs can be tight fitting (where the air is supplied to the facepiece) or loose fitting (where the air is supplied into the helmet rather than the facepiece). The latter are more comfortable. PAPRs are more protective than a halfmask respirator and breathing resistance is lower. They are also comfortable to use (especially in hot areas) because the blower produces a cooling effect by forcing air into the mask.

In a context of the PAPRs' utilization in an operating room (OR), the air exhaled by a wearer is generally expected to contain some aerosolized microorganisms. In contrast to other types of respirators (e.g., N95 RPD), the air expired from a PAPR wearer is not filtered. This suggests a potential for bio-contamination of sterile fields in an OR.

Little data are available on the performance of RPDs used in healthcare settings. In particular, there is no information on the potential bacterial contamination of sterile fields in ORs by the air exhaled by healthcare workers wearing PAPRs.

This simulation pilot study is primarily focused on assessing the bacterial contamination of sterile field surfaces by PAPR wearers in ORs. The investigation is of a special importance given that PAPRs are increasingly used in healthcare settings during infectious disease outbreaks and other relevant situations. NIOSH is particularly interested in evaluating the risks associated with the potential bacterial contamination considering the existing CDC recommendations about use of personal protective equipment, including PAPRs, in hospitals, e.g., when caring for influenza patients undergoing aerosol generating procedures. Given the wide utilization of N95 FFRs in healthcare environments, it is meaningful to view the PAPR potential contamination data in comparison to the ones obtained for N95 FFR wearers as well as for unprotected workers in an OR. The present pilot study is the first of a kind in an effort to determine the safety of using PAPRs and other RPDs in a sterile environment.

Considering various sources of bacterial contamination of sterile fields in an actual OR and, generally, a complexity of an OR environment (Ritter, 1999), it would be difficult to differentiate the contamination specifically associated with RPD wearers from other sources that may lead to microbial colonization and consequently cause infection (Edmiston et al., 2005). From this perspective, a simulation study, which focuses on the air exhaled from RPD wearers in a laboratory controlled environment (an OR-simulating test facility), is believed to be more definitive than a field investigation in a hospital setting.

The viable bacterial contamination on surfaces (such as a sterile field) is conventionally quantified by taking surface samples, incubation them on agar media and enumerating of colony forming unit (CFU) per unit of the sampled surface (Yates et al., 2016). By comparing the CFU counts on surfaces occurring after a period during which the RPD-wearing subjects performed a series of OR-relevant activities to the CFU count measured in absence of the subjects (controls), the bacterial contamination associated with exhaled air can be determined. When implementing this study design, it is imperative to assure that no other sources of viable bacteria are of significance (this includes, for instance, emission from subjects' skin and other surfaces during the test conducted in the test chamber) and thus, the CFU count, if detected, can be attributed to the air exhaled by the subjects.

Objectives

The main objective of this study is to evaluate the potential of bacterial contamination from PAPR exhaust in an OR's sterile field using the laboratory simulation facility.

Additional objectives are to conduct the same evaluation involving N95 FFR wearers as well as unprotected subjects.

Variables and Controls

In this study, the CFU count on agar plates placed at different locations across the sterile field in each experiment serves as a dependent variable.

The study independent variables are the group indicators such as

- RPD wearers in the chamber with PAPR and N95 FFR,
- unprotected subjects (no RPD) in the chamber serving as positive controls, and
- no subjects in the chamber: empty chamber (labeled as "cBlank") and the chamber with a breathing manikin wearing the PAPR (labeled as "cManikin") serving as negative controls.

The data collected in negative control experiments represent the background bacterial levels in the absence and presence of breathing air flow, respectively. It is important to note that both negative controls did not involve human exhalation that may generate airborne bacteria and contaminate surfaces.

As a separate effort, the tests with subjects wearing no respirators were also performed to generate valuable information about potential bacterial contamination of sterile fields by unprotected healthcare workers; these experiments allowed collecting a “positive control” database.

Major Scientific Questions Hypotheses

PRIMARY: Is the bacterial contamination (measured as an average CFU count on agar plates strategically placed within sterile field locations) in the presence of respirator wearers significantly different from the negative controls? If there is a difference, was it detected across the entire field (at all locations where measurements were conducted) or at specific locations? These questions should be answered for PAPR and N95 FFR wearers. Considering the fact that in the study design some agar plate locations are closer to the subjects, if there is a difference in average contamination levels at specific locations, it is reasonable to expect that these locations would be closer to the subjects.

SECONDARY: Is the bacterial contamination (measured as an average CFU on agar plates) in presence of unprotected (not wearing RPDs) subjects significantly different from that generated by respirator-wearing subjects? If there is a difference, was it detected across the entire field (at all locations where measurements were conducted) or at specific locations? These questions should be answered for PAPR and N95 FFR wearers. Here, again, since some agar plates are strategically placed closer to the subjects, if there is a difference in average contamination levels at specific locations between respirator-wearing subjects and unprotected subjects, this difference is expected to be more prominent at agar plates placed close to the subjects. We also note that the placement of agar plates in both respirator-wearing and unprotected groups is identical, which enables us to investigate the average levels of contamination for each location in a fair comparison.

Hypotheses

Main hypothesis –

Comparison of average levels of bacterial contamination by PAPR wearers and those obtained in negative controls: The air exhaled from a PAPR wearer, on average, generates a higher CFU count across all plates compared to the negative controls. (Mean CFU count on surfaces in presence of subjects is significantly higher than in the negative control tests.)

Additional hypotheses:

Hypothesis 1a – Comparison of location-specific average contamination levels by PAPR wearers and those obtained in negative controls: The air exhaled from a PAPR wearer, on average, generates a higher *location-specific* CFU count compared to the negative controls. (Mean CFU

count at a specific location in presence of subjects is significantly higher than in the negative control tests.)

Hypothesis 2 – Comparison of average levels of bacterial contamination by N95 FFR wearers and those obtained in negative controls: The air exhaled from an N95 FFR wearer, on average, generates a higher CFU count across all plates compared to the negative controls. (Mean CFU count on surfaces in presence of subjects is significantly higher than in the negative control tests.)

Hypothesis 2a – Comparison of location-specific average contamination levels by N95 FFR wearers and those obtained in negative controls: The air exhaled from an N95 FFR wearer, on average, generates a higher *location-specific* CFU count compared to the negative controls. (Mean CFU count at a specific location in presence of subjects is significantly higher than in the negative control tests.)

Hypothesis 3 – Comparison of average levels of bacterial contamination by unprotected versus PAPR-wearing subjects: The air exhaled from an unprotected wearer, on average, generates a different CFU count across all plates than that by a PAPR wearer. (Mean CFU count on surfaces in presence of unprotected subjects is significantly different from that for PAPR-wearing subjects.)

Hypothesis 4 – Comparison of average levels of bacterial contamination by unprotected versus N95 FFR-wearing subjects: The air exhaled from an unprotected wearer, on average, generates a different CFU count across all plates than that by an N95 FFR wearer. (Mean CFU count on surfaces in presence of unprotected subjects is significantly different from that for N95 FFR-wearing subjects.)

Hypothesis 5 – Comparison of average levels of bacterial contamination by PAPR- versus N95 FFR-wearing subjects: The air exhaled from a PAPR wearer, on average, generates a different CFU count across all plates than that by an N95 FFR wearer. (Mean CFU count on surfaces in presence of PAPR-wearing subjects is significantly different from that for N95 FFR-wearing subjects.)

NOTE 1: While it is assumed that the mean contaminations in the respirator groups were higher compared to the negative controls (main hypothesis and hypotheses 1a, 2, and 2a), no assumption about the directions of the differences (higher or lower) were made when comparing data from the unprotected and RPD-wearing groups (hypotheses 3 and 4).

NOTE 2: When examining the differences in CFU counts, it is important to distinguish those obtained across all plates (not location-specific, sometimes referred to as “overall”) from those associated with specific locations of agar plates. The latter are covered by hypothesis 1a and 1b.

For convenience, the summary chart below presents the independent variables, purpose and statistical data analysis method utilized to tests each of the listed hypothesis.

Independent variables	Purpose	Statistical test
Main hypothesis: CFU counts across all plates		
PAPR Manikin wearing respirator (cManikin) Nothing (cBlank)	Compare average CFU counts across all plates between PAPR and Manikin wearing respirator, and PAPR and blank groups	Wilcoxon Rank Sum (One-tailed test) Zero inflated Poisson regression
Hypothesis 1a: Location specific CFU counts		
PAPR Manikin wearing respirator (cManikin) Nothing (cBlank)	Compare average CFU counts for each of the agar plates between PAPR and Manikin wearing respirator, and PAPR and blank groups	Wilcoxon Rank Sum (One-tailed test) Zero inflated Poisson regression
Hypothesis 2: CFU counts across all plates		
N95 FFR Manikin wearing respirator (cManikin) Nothing (cBlank)	Compare average CFU counts for each of the agar plates between N95 and Manikin wearing respirator, and N95 and blank groups	Wilcoxon Rank Sum (One-tailed test) Zero inflated Poisson regression
Hypothesis 2a: Location specific CFU counts		
N95 FFR Manikin wearing respirator (cManikin) Nothing (cBlank)	Compare average CFU counts for each of the agar plates between N95 and Manikin wearing respirator, and N95 and blank groups	Wilcoxon Rank Sum (One-tailed test) Zero inflated Poisson regression
Hypothesis 3: CFU counts across all plates		
PAPR Unprotected subject (Positive control)	Compare average CFU counts across all plates between PAPR and positive control groups	Wilcoxon Rank Sum (Two-tailed test) Zero inflated Poisson regression
Hypothesis 4: CFU counts across all plates		
N95 FFR Unprotected subject (Positive control)	Compare average CFU counts across all plates between N95 and positive control groups	Wilcoxon Rank Sum (Two-tailed test) Zero inflated Poisson regression
Hypothesis 5: CFU counts across all plates		
PAPR N95 FFR	Compare average CFU counts across all plates between PAPR and N95 groups	Wilcoxon Rank Sum (Two-tailed test) Zero inflated Poisson regression

Study Design and Data Collection Methods

The study was conducted in a 24-m³ exposure test chamber simulating an OR. The bacterial contamination was measured using a standard culture-based method. Tryptic soy agar (Becton, Dickinson and Co., Sparks, MD) plates were placed at specific locations on the body of a patient-simulating manikin positioned on a Surgical Table (12 plates) as well as on the Back Table (additional 4 plates) as shown in Figure 1. The plates were uncovered in the beginning of the test and covered and removed at the end. For instance, in the tests involving subjects, the plates were uncovered precisely when the subjects entered the chamber and covered and removed when the subjects finished the test and exited. In the negative control tests with no subjects in the chamber, the plates were exposed at the same locations for the same period of time. The exposed plates were incubated at 37°C for 24 hours. Subsequently, a colony forming unit (CFU) enumeration was performed on all 16 agar plates per test.

Experimental conditions in the test chamber

Appropriate experimental conditions were established in the chamber based on collaboration between the University of Cincinnati investigators and colleagues from NIOSH and AORN. In addition, the team was advised by an OR practitioner (surgeon with a 30-year OR experience) and a healthcare facility management expert.

Parameters such as the air exchange rate (AER) in the chamber were considered important for the OR-simulation. While the existing ORs utilize different AERs (often depending on the age of a health-care facility), it was determined that the test chamber used in this study be operated at a total AER of 20 h⁻¹ of which 16 h⁻¹ is a close-loop rate and additional 4 h⁻¹ is an ambient exchange rate. The ventilation system of the exposure test chamber available in the PI's laboratory was modified accordingly.

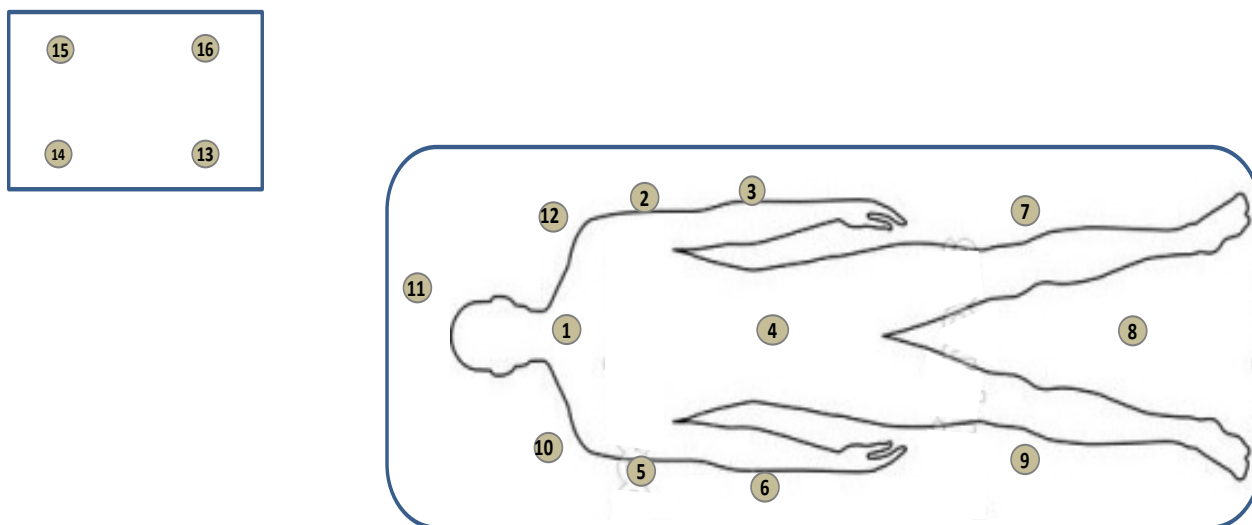


Figure 1. Agar plate placement on the Surgical Table (right) and Back Table (left).

The air temperature in the chamber was $T = 20 \pm 2$ °C and the relative humidity was within a range of $RH \approx 50$ to 75%. While, generally speaking, environmental conditions such as temperature and humidity may be perceived as confounding variables, there is no evidence in the literature that bacterial survival would be affected by T and RH within the above ranges.

The experiments involving respirator-wearing subjects, unprotected subjects, and unoccupied chamber (with and without breathing manikin) were randomized. The air in the chamber was purified between experiments by operating a close-loop air filtration system for 20 min at AER = 20 h^{-1} . The chamber interior surfaces, including walls and the floor, manikin, as well as the Surgical Table and Back Table, were cleaned using wipes with alcohol after each experiment to avoid/minimize an uncontrolled microbial contamination. The subjects entered the chamber in protective clothing covering their bodies (see details below) so that the only source of bacterial contamination was believed to be associated with the air exhaled by the subjects. The very low CFU counts obtained in the negative control tests (< 1 CFU, see the Results section below) serves as evidence that the test procedure did not introduce bacterial contamination beyond the one being examined.

Test protocol

Each test included two subjects simulating a typical OR procedure involving a surgeon and anesthesiologist or a surgeon and operating nurse (a two-subject protocol was chosen following the NIOSH recommendations). The subjects were wearing identical respirators (either PAPRs or N95s in a given test) and performing specific procedures on the manikin such as CPR, talking (reading the “rainbow passage”), and turning (re-positioning) the patient-simulating manikin on the Surgical Table. The subjects were also taking rest (no activities) between these procedures. In the preliminary phase of the study, while establishing the methods and protocols, we used two different manikins simulating a patient. Subsequently, the more sophisticated one (allowing for a full chest compression) was selected for further testing.

The following activities were included in a single cycle:

- Minutes 0-2:* one subject conducts CPR while the other reads the “rainbow passage (the subjects take turns for the above activities);
- Minute 3:* both subjects are at rest;
- Minute 4:* both subjects re-position the manikin;
- Minute 5:* both subjects are at rest.

This 5-min cycle was repeated 12 times making the overall test duration equal to one hour. After each two cycles, the two subjects rotated around the table (between locations near plates labeled “2” and “5” in Figure 1). These locations were selected for the two subjects to simulate common surgical procedures, e.g., those involving heart, chest or abdominal areas.

Respirator models

Various PAPR models were reviewed in collaboration with the NIOSH staff. As a result, a widely used PAPR – 3M White Respirator Head Cover, BE-12-3 (3M, N. Oakdale, MN) – was chosen for the tests. Additionally, an N95 filtering facepiece particulate respirator (1860-N95, 3M) was included in the testing program. The chosen models of respiratory protective devices were approved by NIOSH.

Subject recruitment, medical clearance and training

Following an extensive screening, fourteen human subjects were recruited and medically cleared for the study via the Occupational Pulmonary Program at the University of Cincinnati Center for Occupational Health (Director: Dr. McKay). The study cohort included a medical doctor, two nurses, eight students and staff members of the University of Cincinnati College of Medicine, and three other individuals. Each subject reviewed and signed the IRB-approved consent prior to being tested. All subjects were older than 18 years of age.

All the subjects attended specially designed training sessions that were provided by two trainers – registered nurses of the Nurse Anesthesia Program selected among certified graduate students of the University of Cincinnati College of Nursing. The training addressed preparation (handwashing, hair issues), donning OR-relevant personal protective equipment (shoe covers, inner and outer gloves, gown, etc.), as well as donning respirators (PAPR and an N95 facepieces). The training also covered the CPR and techniques for re-positioning a patient on the Surgical Table. As a quality control measure, the trainers observed each subject when he/she was donning the protective clothing and respirators. The trainers also observed the subjects operating in the exposure chamber following training sessions. Additionally, the subjects learned about locations and management of sterile fields in an OR. Details of the training program are provided in Appendix 1.

Sample size and number of plates analyzed

A sample size of $n=7$ (seven pairs of subjects) was selected for this pilot study based on logistical considerations and available time and resources. The sample size was approved by NIOSH for this project.

Each test involved sixteen agar plates; tests performed with respirator-wearing subjects were conducted with two different respirators; two negative controls were generated for each test; five “positive controls” (unprotected subjects) were generated (in the latter case, $n=5$ was shown to be sufficient to demonstrate statistically significant differences). Thus, the total number of agar plates involved in the tests was $16 \times (7 \times 2 + 7 \times 2 + 5) = 528$.

Data Analysis Methods

Given 16 locations tested, the Bonferroni correction factor ($\text{Alpha} = 0.05/16=0.003125$) was utilized as the significance threshold for location-specific comparisons. The overall (not

location-specific) comparisons are performed using a significance threshold of 0.05. The statistical analysis was performed using two methods: the nonparametric Wilcoxon Rank Sum test and a zero-inflated Poisson (ZIP) regression with a simple inflation model. Wilcoxon Rank Sum test provides a useful non-parametric test and is believed to be robust to Type 1 errors. Additionally, the test is more powerful compared to t-tests when data are not from a normal distribution as is the case for count data (e.g., Bridge & Sawilowsky, 1999). Since it is acknowledged that a substantial number of agar plates in our experiments produced zero CFUs, zero-inflated Poisson regression was deployed as a method offering a viable and powerful approach for analysis. Zero-inflated Poisson regression assumes that the data are discrete counts and allows for zero inflation in the data (cf. McElduff et al., 2010).

Analyses of the data with a zero-inflated Poisson regression were performed separately for each two-way comparison. In other words, we analyzed – using separate ZIP models – comparisons between

- the PAPR-wearing group and each of the two negative control groups (without the breathing manikin and with it),
- the N95 FFR-wearing group and each of the two negative control groups,
- the PAPR and N95 FFR-wearing groups,
- the unprotected group and the PAPR group, and
- the unprotected group and the N95 FFR group.

Alternatively, one could have created a multi-level categorical variable for the groups and use one Poisson model to perform all comparisons in one step. This, however, would have led to a more complex model and more difficult interpretations. Before each analysis, at each location, we re-formatted the data into a long format and created a categorical indicator variable for the groups. For example, for the analysis of differences between PAPR and control without the breathing manikin, our re-formatted data for agar plate # 1 can be presented as follows:

Re-formatted data for agar plate 1		
	CFU	Group Indicator
1	0	PAPR
2	2	PAPR
3	0	PAPR
4	3	PAPR
5	1	PAPR
6	2	PAPR
7	1	PAPR
8	1	Control without manikin
9	0	Control without manikin
10	1	Control without manikin
11	0	Control without manikin
12	0	Control without manikin
13	0	Control without manikin
14	0	Control without manikin

Here, when comparing the PAPR data with controls without the manikin, we had 14 observations for each location since there were seven experiments for each group. For the overall comparison, we had $14 \times 16 = 224$ observations after pooling the data by rows from 16 locations. Once the data were converted into the regression-friendly format, we regressed the CFU variable against the group indicator and estimated the corresponding regression coefficients and the P-values via maximization of the likelihood function using R package *pscl* (Jackman, 2015). The exponentiated coefficients from the ZIP models were reported as the estimated relative risks. In our analysis, we also considered using simple Poisson regression without accounting for zero inflation in the data. Based on the Vuong test (cf. Vuong, 1989), the ZIP model generally offered a better model fit compared to the simple Poisson regression. For example, for the overall comparisons of the contamination between the PAPR and the control group without a manikin, the Vuong z-statistic produced -2.112685 and indicated that the ZIP was a better model with a P-value of 0.017314 (significant at 0.05 level); for the overall comparison between the PAPR and the control group with the breathing manikin, the Vuong z-statistic gave -2.169719 and indicated that the ZIP was a better model with a $P = 0.015014$ (significant at 0.05 level). For the overall comparison between the N95 and the control group without the manikin, the Vuong z-statistic gave -0.7436208 and indicated that the ZIP was a better model with a $P = 0.2285530$ (not significant at 0.05 level); for the overall comparison between the N95 and the control group with the manikin, the Vuong z-statistic gave -0.8991775 and indicated that the ZIP was a better model with $P = 0.184279$ (not significant at 0.05 level). Provided the above considerations, we do not present the results from the simple Poisson regression in this report.

Results

Contamination by PAPR and N95 FFR wearers

The CFU count performed on agar plates collected in seven tests involving PAPR wearers generated average values ranging from 0.44 to 2.20 CFU per plate. The arithmetic mean and standard deviation of all counts are 1.11 and 1.25, respectively (see Table A2-1a of Appendix 2).

The CFU count performed on agar plates collected in seven tests involving N95 FFR wearers generated average values ranging from 0.40 to 1.53 CFU per plate. The arithmetic mean and standard deviation of all counts are 0.88 and 0.96, respectively (see Table A2-1b of Appendix 2).

With the overall area of the sterile field (Surgical Table + Back Table) $\sim 1 \text{ m}^2$ and the area of a single agar plate being $\sim 60 \text{ cm}^2$, a per-plate contamination of $\sim 1 \text{ CFU}$ can be converted to $\sim 166 \text{ CFU/m}^2$, i.e. the total bacterial contamination of the sterile field can be in order of 166 CFU.

Wilcoxon Rank Sum test

Table 1a presents the mean contamination levels by respirator and negative control groups. In this table, we see that mean bacterial contamination levels for the respirator groups are generally higher for each location and for overall means. Table 1b presents the mean differences between the groups. Here, again, the majority of the differences between mean contaminations is positive indicating that contamination of the sterile field in the respirator wearing groups is higher, on

average, compared the control groups. It is also clear that the magnitude of the mean differences changes by location suggesting an increase in average contamination in the respirator groups at locations closer to the subjects.

Table 1a: Mean contamination levels by groups

	<u>PAPR</u>	<u>N95</u>	<u>cManikin</u>	<u>cBlank</u>
1	1.2857	0.8571	0.5714	0.2857
2	1.8571	1.4286	0.4286	0.1429
3	0.7143	0.8571	0.2857	0
4	1	1.1429	1	0.1429
5	2.8571	1.8571	0.5714	0.2857
6	1.5714	1.4286	0.8571	0
7	1.7143	0.4286	0.5714	0.1429
8	1	0.2857	0.5714	0.5714
9	0.5714	0.7143	0.4286	0.2857
10	1.8571	1.2857	0.1429	0.1429
11	0.5714	0.7143	0.5714	0.2857
12	1	0.8571	0.5714	0
13	0.8571	0.7143	0.4286	0.5714
14	0.1429	0.5714	0.8571	0
15	0.7143	0.7143	0	0.2857
16	0.8571	0.5714	0.7143	0
Overall:	1.1607	0.9018	0.5357	0.1964

Table 1b: Difference in mean contamination levels

	<u>PAPR vs. cManikin</u>	<u>PAPR vs. cBlank</u>	<u>N95 vs. cManikin</u>	<u>N95 vs. cBlank</u>
1	0.7143	1	0.2857	0.5714
2	1.4285	1.7142	1	1.2857
3	0.4286	0.7143	0.5714	0.8571
4	0	0.8571	0.1429	1
5	2.2857	2.5714	1.2857	1.5714
6	0.7143	1.5714	0.5715	1.4286
7	1.1429	1.5714	-0.1428	0.2857
8	0.4286	0.4286	-0.2857	-0.2857
9	0.1428	0.2857	0.2857	0.4286
10	1.7142	1.7142	1.1428	1.1428
11	0	0.2857	0.1429	0.4286
12	0.4286	1	0.2857	0.8571
13	0.4285	0.2857	0.2857	0.1429
14	-0.7142	0.1429	-0.2857	0.5714
15	0.7143	0.4286	0.7143	0.4286
16	0.1428	0.8571	-0.1429	0.5714
Overall:	0.625	0.9643	0.3661	0.7054

Table 1c presents the P-values from the one-sided Wilcoxon Rank Sum test for the test-control comparisons performed separately for the PAPR and for the N95 FFR. The analysis of the full-scale database (n=7 per group) carried out using the Wilcoxon Rank Sum test revealed that median contamination from a PAPR wearer is significantly higher compared to median contamination in an empty chamber at only one agar plate location of 16 (# 6, P = 0.0004). Once the breathing manikin setting was used as a control, the analysis failed to detect any statistically significant differences in median contamination levels at any of the 16 locations. The comparisons between N95 and control groups with and without the breathing manikin also failed to detect any statistically significant differences in median contamination levels. These findings relate to a *location-specific* bacterial contamination (i.e., CFU differences associated with a specific location). The analysis of the pooled data without information on agar plate locations showed statistically significant difference in median contamination levels between PAPR and both control groups (with/without the breathing manikin) with P-values of 0.0001 and 0.0000, respectively. Similarly, based on the pooled analysis, there was a statistically significant difference in median CFU counts between N95 FFR data and control group without manikin (P-value of 0.0000), and a marginally statistically significant difference in median contamination levels between N95 FFR data and control group with the manikin (P-value of 0.0034). We note that in Wilcoxon Rank Sum test, we test whether the distribution of CFU counts in one group is stochastically larger than the distribution of CFU counts in the other group (c.f Mann et al. 1947). In other words, the statistical null hypothesis for Wilcoxon Rank Sum test is equivalent to the following statement: “it is equally likely that a randomly selected number from one group is less than or greater than a randomly selected number from another group.” When the shapes of the distributions in two groups are identical, the null hypothesis can be expressed in the term of differences in medians between groups.

Table 1c: P Values - One Sided Wilcoxon Rank Sum Test (alpha = 0.003125)

	<u>p.PAPR vs. cManikin</u>	<u>p.PAPR vs. cBlank</u>	<u>p.N95 vs. cManikin</u>	<u>p.N95 vs. cBlank</u>
1	0.0958	0.0360	0.2166	0.1110
2	0.0160	0.0045	0.0239	0.0052
3	0.2266	0.0374	0.2269	0.0377
4	0.5269	0.0497	0.5546	0.0998
5	0.0891	0.0236	0.0315	0.0098
6	0.0813	0.0004	0.1911	0.0056
7	0.2854	0.1002	0.6145	0.1449
8	0.3134	0.2668	0.8676	0.7752
9	0.4422	0.2727	0.3598	0.2266
10	0.0163	0.0163	0.0186	0.0186
11	0.6734	0.4679	0.2839	0.0706
12	0.2997	0.0374	0.2147	0.0148
13	0.2751	0.3270	0.3266	0.3538
14	0.9641	0.1957	0.8228	0.0865
15	0.0374	0.2266	0.0148	0.1376
16	0.5000	0.0148	0.6395	0.0139
Overall:	0.0001	0.0000	0.0034	0.0000

Poisson regression

Table 1d presents the P-values from the zero-inflated Poisson regression. For PAPR, the results presented in Table 1d are partially consistent with the P-values listed in Table 1c. Here, again, we see an *overall* statistically significant difference in mean contamination levels between the PAPR and both negative control groups, with and without the breathing manikin, with P-values less than 0.001. For agar-plate-specific comparisons between the PAPR and the control groups with the breathing manikin, none of the comparisons were statistically significant which is consistent with the findings presented in Table 1c. For plate location-specific comparisons between the PAPR and the negative control groups without the breathing manikin, we again found no statistically significant difference in the average contamination from the PAPR compared to the unoccupied (empty) chamber.

Table 1d: P Values – Zero Inflated Poisson Regression (Alpha = 0.003125)

	<u>p.PAPR vs. cManikin</u>	<u>p.PAPR vs. cBlank</u>	<u>p.N95 vs. cManikin</u>	<u>p.N95 vs. cBlank</u>
1	0.3385	0.0544	0.816	0.1785
2	0.0221	0.0134	0.0674	0.0281
3	0.2786	-	0.1789	-
4	1	0.0753	0.4639	0.0699
5	0.0067	0.0119	0.0393	0.0148
6	0.2324	-	0.5519	-
7	0.0312	0.0293	0.7064	0.3414
8	0.3719	0.3917	0.4235	0.4235
9	0.7064	0.4235	0.4809	0.2786
10	0.0163	0.0163	0.0375	0.0375
11	0.7623	0.3493	0.739	0.2734
12	0.6265	-	0.816	-
13	0.4237	0.8063	0.5834	0.9834
14	0.0972	-	0.816	-
15	-	0.2786	-	0.2734
16	0.7632	-	0.7394	-
Overall:	0	0	0.0032	0

These findings imply that although we were able to detect statistically significant differences in overall (across all plates) mean and median contamination levels between PAPR respirator and control groups, we could not attribute these differences to specific locations with certainty. While in all the comparisons above, we used a conservative threshold of 0.05/16, we note that the conclusions do not change when a different threshold of $0.05/17 = 0.0029$, which allows adjusting for the additional overall comparison, is deployed.

When comparing the N95 FFR and the negative control groups using the zero-inflated Poisson regression, we failed to detect any statistically significant differences in mean contamination levels between the groups in location specific analysis, with the significance threshold of $\alpha =$

0.003125. However, we see that the overall average contamination in the N95 FFR group is significantly higher compared to the control group without a manikin (P-value = 0) and significantly higher compared to the control group with a manikin (P-value = 0.0032) using a threshold of 0.05.

It is noted that the Wilcoxon Rank Sum test conducted for the N95 FFR provided a result consistent with Table 1d suggesting an *overall* mean difference in contamination to be either significant or marginally significant (depending on the control type). In Table 1d, we also note that P-values for some agar-plate location in ZIP are not estimable due to zero variability in the observations.

Interpretation of differences between findings obtained for PAPR and N95 FFR

In summary, based on both Wilcoxon Rank Sum test and zero-inflated Poisson regression, mean CFU counts on surfaces in presence of PAPR-wearing subjects is significantly higher than in both negative control groups. The analysis of average contamination between N95-wearer and the control groups using Poisson regression failed to detect significant differences in mean contamination levels. This can be attributed to the way the respirator handles the exhalation air flow. Although a PAPR dilutes the exhaled air (thus decreasing bioaerosol concentration), it does not have a filter that would capture the aerosol particles exiting the respirator. In absence of such a collector, the exhaled particles exit into the chamber and become potential indoor bio-contaminants. In contrast, an N95 FFR has a filter, which is capable of capturing airborne particles in both directions: in inhaled and exhaled air. Furthermore, bacteria generated by exhalation are likely carried by larger particles (saliva droplets and alike) which can be effectively removed by an N95 filter or even by a less efficient surgical mask. Therefore, it is not surprising that a PAPR wearer may more likely contaminate the indoor environment than an N95 FFR wearer, as suggested by the data analysis utilizing the Poisson regression.

The two-sided p-values for the direct comparison of CFU levels from experiments conducted with PAPR and N95 FFR are presented in Table 1e. These p-values are obtained using the Wilcoxon Rank Sum test and zero-inflated Poisson regression. Here, while we notice that the P-values from the ZIP model are definitively smaller for agar-plate locations 5 and 6 compared to P-values from the Wilcoxon Rank Sum test, using the $\alpha = 0.003125$ as a significant threshold, both the Wilcoxon Rank Sum test and zero-inflated Poisson regression fail to detect a statistically significant location-specific differences in average contamination levels between the PAPR and N95 FFR groups. For the overall comparison, the P-value from comparing PAPR vs N95 using the two-sided Wilcoxon Rank Sum test was found to be 0.499 indicating a failure to detect any significant difference between the median CFU counts across plates in these groups. The P-value from ZIP model is equal to 0.0272 leading to a different conclusion once a significance threshold of 0.05 is used.

Table 1e: Comparison between
PAPR vs N94 FFR (Alpha =
0.003125)

	PAPR vs N95 Wilcoxon p- value	PAPR vs N95 ZIP P- value
1	0.5035	0.4470
2	0.5961	0.5328
3	0.9432	0.7263
4	1.0000	0.4639
5	0.8966	0.0879
6	0.7880	0.8274
7	0.5693	0.0126
8	0.2227	0.1246
9	0.8862	0.7154
10	0.6881	0.3552
11	0.2840	0.7394
12	0.9446	0.5281
13	0.9432	0.7263
14	0.5329	0.2410
15	0.9446	0.9751
16	0.8303	0.5299
Overall:	0.4989	0.0272

Contamination by unprotected subjects

Additionally, the so-called “positive control” database was generated with pairs of subjects following the same protocol as in regular experiments but not wearing RPDs. This effort is a valuable addition to the initially proposed test program not only because it helps refine the study methodology, but also because it allows generating an independent database on the bacterial contamination of sterile fields by *unprotected health-care workers*.

The CFU count performed on agar plates collected in the tests involving unprotected subjects generated average values ranging from 1.38 to 8.50 CFU per plate. The arithmetic mean and standard deviation of all counts are 4.53 and 3.46, respectively (see Table A2-4 of Appendix 2).

Considering the overall area of the sterile field (Surgical Table + Back Table) being $\sim 1 \text{ m}^2$ and the area of a single agar plate being $\sim 60 \text{ cm}^2$, a per-plate contamination of $\sim 5 \text{ CFU}$ can be converted to $\sim 830 \text{ CFU/m}^2$. This suggests that the total bacterial contamination of the sterile field from a pair of unprotected healthcare workers in an OR can be in order of 830 CFU.

Table 2a presents the mean contamination levels in the unprotected group along with the differences in means between the unprotected and RPD-wearing groups. From this table, we see that the mean contamination levels are generally higher in the unprotected group.

Table 2a: Mean contamination by unprotected subjects and mean difference between the unprotected and respirator-wearing groups

	<u>Mean unprotected</u>	<u>Difference: Unprotected vs. PAPR</u>	<u>Difference: Unprotected vs. N95</u>
1	6	4.7143	5.1429
2	8.4	6.5429	6.9714
3	3.2	2.4857	2.3429
4	16.4	15.4	15.2571
5	15	12.1429	13.1429
6	8	6.4286	6.5714
7	1.2	-0.5143	0.7714
8	0.2	-0.8	-0.0857
9	4	3.4286	3.2857
10	2	0.1429	0.7143
11	1.8	1.2286	1.0857
12	2.8	1.8	1.9429
13	0.4	-0.4571	-0.3143
14	1.2	1.0571	0.6286
15	0.6	-0.1143	-0.1143
16	1.2	0.3429	0.6286
Overall:	4.525	3.3643	3.6232

Table 2b presents the results from the Wilcoxon Rank Sum test. Based on Table 2b, the comparison of positive control (unprotected subjects) and regular (respirator-wearing subjects) groups allowed detecting a statistically significant overall difference in median contamination levels at 0.05 significance threshold:

- between unprotected and PAPR-wearing subject groups (P-value = 0.0002) and
- between unprotected and N95-wearing subject groups (P-value = 0.0001).

Table 2b also shows that the data analysis – for both the PAPR and N95 respirators – performed using the Wilcoxon Rank Sum test failed to reveal differences in median contaminations associated with a specific agar plate location since all location-specific comparisons resulted on P-values above the significance threshold of 0.003125.

Table 2b: P Values – Two-Sided Wilcoxon Rank Sum Test (alpha = 0.003125)

	<u>p.PosControl.vs.PAPR</u>	<u>p.PosControl.vs.N95</u>
1	0.1368	0.0793
2	0.0267	0.0135
3	0.5400	0.6016
4	0.0053	0.0062
5	0.0605	0.0218
6	0.2240	0.1354
7	0.7148	0.7142
8	0.2010	0.8292
9	0.1063	0.1485
10	0.8673	0.4007
11	0.1150	0.1366
12	0.1554	0.0537
13	0.7148	0.8531
14	0.0996	0.3631
15	0.6984	0.4649
16	0.7309	0.4837
Overall:	0.0002	0.0001

Table 2c: P Values – P Values – Zero Inflated Poisson Regression (alpha = 0.003125)

	<u>p.PosControl.vs.PAPR</u>	<u>p.PosControl.vs.N95</u>
1	0.0001	0.0001
2	0	0
3	0.012	0.0294
4	0	0.0051
5	0	0
6	-	0
7	0.5387	0.0723
8	0.1412	0.7709
9	0.0011	0.0048
10	0.9875	0.3451
11	0.1806	0.0975
12	0.0262	0.0153
13	0.306	0.4732
14	0.0572	0.6
15	0.5288	0.6612
16	0.5466	0.253
Overall	0	0

Table 2c summarizes the results from the zero-inflated Poisson regression. Here, the PAPR and the N95 FFR groups are considered as the reference groups relative to the data generated by unprotected subjects (wearing no respirators). The results shows that the mean CFU count is significantly different between positive control and PAPR groups ($P = 0.000000$). We also observe a significant difference in mean contamination levels for agar plate locations #1, 2, 4, 5 and 9. Table 2c also demonstrates that the mean CFU count is significantly different between positive control and N95 groups ($P = 0.000000$). A significant difference in mean contamination levels for agar plate locations #1, 2, 5 and 6 is also seen. In Table 2c, note again that p-values for some agar-plate location are not estimable due to zero variability in the observations.

Conclusions

The statistical analysis revealed that, on average, the bacterial contamination of sterile fields by a pair of subjects operating in an OR-simulating facility while wearing either PAPRs or N95 FFRs is significantly higher than that obtained in both negative control tests (empty chamber and chamber with the breathing manikin). This conclusion was drawn from both statistical approaches (the Wilcoxon Rank Sum test and the zero-inflated Poisson regression). These conclusions are drawn from the comparison of *overall* (not location-specific CFU counts). When comparing the respirator and control groups *per each agar plate location* separately, we found no statistically significant difference in the mean contamination values *associated with a specific agar plate location* for either of the two respirators tested.

The difference between contamination levels (in median CFU counts) generated by the PAPR and N95 wearers is not significant based on the Wilcoxon Rank Sum test; at the same time, ZIP model suggests that the difference in mean CFU counts between the PAPR and N95 FFR groups has a statistical significance. It is explainable why the PAPR wearers generated, on average, significantly higher *overall* exhalation-associated bacterial contamination while the N95 wearers may not. The PAPR does not have a filter that can capture particles exiting the respirator while the N95 filter is capable of removing bioaerosol particles in both airflows – inhaled and also exhaled. Furthermore, bacteria generated through exhalation are likely carried by larger particles (e.g., saliva droplets); large particles can be effectively removed by an N95 filter or even by a less efficient surgical mask when exiting these protective devices.

Based on both the Wilcoxon Rank Sum test and the zero-inflated Poisson regression, the analysis of data generated by unprotected subjects and PAPR-wearing ones revealed that the mean bacterial contamination was significantly higher in the former group. Based on zero-inflated Poisson regression, the agar plate-specific comparison indicated that these differences are mainly due to contamination occurred at the locations closest to the subjects. Specifically, we found the mean CFU counts to be statistically significantly different between the unprotected and PAPR-wearing groups at agar plate locations #1, 2, 4, 5 and 9. Similarly, the mean contamination levels produced by unprotected subjects were significantly higher than those produced by the N95 FFR wearers (based on both Wilcoxon Rank Sum test and the zero-inflated Poisson regression). The latter conducted for the location-specific comparison revealed statistically significant differences between mean contamination levels produced by the unprotected group

and N95 FFR-wearing group at locations #1, 2, 5 and 6. We believe that the inclusion of unprotected subjects into this investigation is beneficial not only because it helps refining the study methodology, but also because it allows generating an independent database on the bacterial contamination of OR's sterile fields by *unprotected health-care workers*.

To summarize the main findings of this study, we presented each result relative to the corresponding hypothesis and comparison that was tested, see Table 3 below.

Study Limitations and Future Research

While this investigation generated meaningful experimental results, this was a pilot study conducted within limited resources and as such it has several limitations. For instance, the OR-simulation chamber used in the study had fixed dimensions while actual ORs vary by dimensions. Likewise, the tests in the chamber were conducted at a fixed air exchange regime typical to modern hospital facilities. At the same time, ventilation conditions may differ from one hospital facility to another; e.g., some old stationary facilities operate at AERs as low as 12 h⁻¹, and some temporary field settings may have even lower AER. Although the chosen set of activities and procedures followed by the subjects in the chamber, the number of subjects per test as well as the one-hour duration are relevant to the OR environment, this study did not aim at addressing different surgical scenario. Finally, the number of replicate tests performed in this pilot research effort was limited by the available resources; a greater number of subjects and replicates may be considered in future efforts addressing the bacterial contamination of sterile fields by respirator wearers in ORs. Different models of respirators as well as surgical masks may be considered to be deployed in future studies. Eventually, a protocol should be developed to conduct a study in actual hospital settings to complement the laboratory-generated data.

Table 3: Hypotheses and findings

Hypothesis	Hypothesis translated to the comparison of measurable outcomes (CFUs)	Result
<u>Main hypothesis:</u> <u>Comparison of average levels of bacterial contamination by PAPR wearers and those obtained in negative controls:</u> The air exhaled from a PAPR wearer, on average, generates a higher CFU count across all plates compared to the negative controls.	Mean CFU count on surfaces (across locations) in presence of subjects is significantly higher than in the negative control tests.	Data support that PAPR wearers, on average, generated a higher overall (across locations) exhalation-associated bacterial contamination of the sterile field in an OR compared to both negative controls.
<u>Hypothesis 1a:</u> <u>Comparison of location-specific average contamination levels by PAPR wearers and those obtained in negative controls:</u> The air exhaled from a PAPR wearer, on average, generates a higher <i>location-specific</i> CFU count compared to the negative controls.	Mean CFU count at a specific location in presence of subjects is significantly higher than in the negative control tests.	Data do not provide enough evidence to support this hypothesis and to identify specific locations (found no statistically significant difference in location-specific mean contamination levels, except one location).
<u>Hypothesis 2:</u> <u>Comparison of average levels of bacterial contamination by N95 FFR wearers and those obtained in negative controls:</u> The air exhaled from an N95 FFR wearer, on average, generates a higher CFU count across all plates compared to the negative controls.	Mean CFU count on surfaces (across locations) in presence of subjects is significantly higher than in the negative control tests.	Data support that N95 FFR wearers, on average, generated a higher overall (across locations) exhalation-associated bacterial contamination of the sterile field in an OR compared to both negative controls.
<u>Hypothesis 2a:</u> <u>Comparison of location-specific average contamination levels by N95 FFR wearers and those obtained in negative controls:</u> The air exhaled from an N95 FFR wearer, on average, generates a higher <i>location-specific</i> CFU count compared to the negative controls.	Mean CFU count at a specific location in presence of subjects is significantly higher than in the negative control tests.	Data do not provide enough evidence to support this hypothesis and to identify specific locations (found no statistically significant difference in location-specific mean contamination levels).

Hypothesis 3: <u>Comparison of average levels of bacterial contamination by unprotected versus PAPR-wearing subjects:</u> The air exhaled from an unprotected wearer, on average, generates a different CFU count across all plates than that by a PAPR wearer.	Mean CFU count on surfaces in presence of unprotected subjects is significantly different from that for PAPR-wearing subjects.	Data support this hypothesis, including for specific locations (found statistically significant difference in mean contamination levels at certain locations).
Hypothesis 4: <u>Comparison of average levels of bacterial contamination by unprotected versus N95 FFR-wearing subjects:</u> The air exhaled from an unprotected wearer, on average, generates a different CFU count across all plates than that by an N95 FFR wearer.	Mean CFU count on surfaces in presence of unprotected subjects is significantly different from that for N95 FFR-wearing subjects.	Data support this hypothesis, including for specific locations (found statistically significant difference in mean contamination levels at certain locations).
Hypothesis 5: <u>Comparison of average levels of bacterial contamination by PAPR versus N95 FFR-wearing subjects:</u> The air exhaled from a PAPR wearer, on average, generates a different CFU count across all plates than that by an N95 FFR wearer.	Mean CFU count on surfaces in presence of PAPR-wearing subjects is significantly different from that for N95 FFR-wearing subjects.	Wilcoxon Rank Sum test did not have enough power to identify statistically significant differences between PAPR and N95 groups and thus did not support this hypothesis. However, based on zero-inflated Poisson regression, data support this hypothesis. Additionally, we found no statistically significant difference in location-specific mean contamination levels).

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APPENDICES

APPENDIX 1 (TRAINING SUBJECTS)

Donning Personal Protective Equipment with PAPR (non-sterile)

1. Wash hands with soap and water for 30 seconds.
2. Long hair should be tied back.
3. Put on shoe covers.
4. Put on inner gloves: put on first pair of gloves.
5. Put on gown. Ensure cuffs of inner gloves are tucked under the sleeve of the gown.
6. Place PAPR (with external belt-mounted blower and tubing) on the outside of the gown.
7. Put on Outer Gloves: Put on second pair of gloves. Ensure the cuffs of gloves are pulled over the sleeves of the gown.
8. Put on Respirator: Put on PAPR with a full face-shield, helmet, or headpiece.
9. Ensure that the hood covers all of the hair and the ears.
10. Verify: After completing the donning process, the trained observer should verify the integrity of the ensemble. The healthcare worker should be able to extend the arms, bend at the waist, and go through a range of motion sufficient for patient care delivery while all remaining correctly covered.

Donning Personal Protective Equipment with N95 FFR

The above steps are repeated in the same order with the following variations. Step 6: instead of placing the external belt-mounted blower, a surgical hat was utilized to ensure hair was covered. Step 7: outer gloves are applied as outlined above. Step 8: an N95 respirator is placed instead of PAPR full face-shield.

<http://www.cdc.gov/vhf/ebola/healthcare-us/ppe/guidance.html>

CPR Training Protocol: 2 minutes

1. Place one hand on top of the other.
2. Interlace fingers.
3. Maintain straight arms with elbows locked.
4. Place both hands on the lower half of the sternum.
5. Maintain hand placement in line and directly below shoulders.
6. Perform chest compressions at a rate of 100 to 120 beats per min.
7. Perform chest compressions to a depth of at least 2 inches (5 cm), allowing full chest recoil between compressions (as accommodated by CPR manikin).
8. Perform uninterrupted chest compressions for 2 minutes.

<https://eccguidelines.heart.org/wp-content/uploads/2015/10/2015-AHA-Guidelines-Highlights-English.pdf>

Turning/re-positioning manikin: 1 minute

1. Both subjects take position on each side of the table, standing midway between the manikin's shoulders and hips.
2. Stand close to the bed, with legs shoulder width apart, knees slightly bent.
3. Subject 1: Reach across the patient, grabbing the opposite shoulder and hip.
 - a. Pull the manikin towards you, achieving a lateral position with the manikin's nondependent shoulder and hip directly above the dependent shoulder and hip.
 - b. Place mannequin supine.
4. Subject 2: Repeat step 3.
5. Subjects alternate turning for one minute.

*Turning protocol modified from <https://www.nlm.nih.gov/medlineplus/ency/patientinstructions/000426.htm>

APPENDIX 2 (RAW DATA)

Table A2-1a. CFU per plate obtained in n=7 tests (16 plates per test) with subjects wearing PAPRs (two subjects operating in each test).

Agar plate #	CFU per plate								
	Test # I	Test # II	Test # III	Test # IV	Test # V	Test # VI	Test # VII	Average	St.Dev
1	0	2	0	3	1	2	1	1.3	1.1
2	2	2	1	4	3	0	1	1.9	1.3
3	0	0	0	1	2	2	0	0.7	1.0
4	0	1	2	0	3	1	0	1.0	1.2
5	0	1	1	0	6	5	7	2.9	3.0
6	1	1	2	1	3	2	1	1.6	0.8
7	5	0	0	0	4	0	3	1.7	2.2
8	0	1	0	1	3	0	2	1.0	1.2
9	0	2	0	1	1	0	0	0.6	0.8
10	0	0	1	3	5	1	3	1.9	1.9
11	0	0	0	3	1	0	0	0.6	1.1
12	0	0	0	1	3	0	3	1.0	1.4
13	0	2	0	0	1	0	3	0.9	1.2
14	0	1	0	0	0	0	0	0.1	0.4
15	0	1	0	0	2	0	2	0.7	1.0
16	0	1	0	1	0	1	3	0.9	1.1
Avg per test	0.53	0.94	0.44	1.19	2.20	0.87	1.73	1.11	1.25

Table A2-1b. CFU per plate obtained in n=7 tests (16 plates per test) with subjects wearing N95 FFRs (two subjects operating in each test).

Agar plate #	CFU per plate								
	Test # I	Test # II	Test # III	Test # IV	Test # V	Test # VI	Test # VII	Average	St.Dev
1	0	0	2	1	2	0	1	0.9	0.9
2	1	2	2	1	0	1	3	1.4	1.0
3	0	1	3	0	0	0	2	0.9	1.2
4	0	0	0	2	4	0	2	1.1	1.6
5	3	0	2	1	2	1	4	1.9	1.3
6	1	2	0	1	3	3	0	1.4	1.3
7	1	0	0	0	1	0	1	0.4	0.5
8	1	0	0	0	0	0	1	0.3	0.5
9	0	2	0	0	1	0	2	0.7	1.0
10	1	3	0	1	3	0	1	1.3	1.3
11	1	1	0	1	1	0	1	0.7	0.5
12	0	0	0	3	1	1	1	0.9	1.1
13	1	0	0	0	3	0	1	0.7	1.1
14	1	0	0	0	3	0	0	0.6	1.1
15	0	0	1	1	1	0	2	0.7	0.8
16	1	1	0	0	1	0	1	0.6	0.5
Avg per test	0.73	0.60	0.67	0.73	1.53	0.40	1.47	0.88	0.96

Table A2-2. CFU per plate obtained in n=7 tests (16 plates per test) in an empty chamber (Control-blank data).

Agar plate #	CFU per plate								
	C1	C2	C3	C4	C5	C6	C7	Average	St.Dev
1	1	0	1	0	0	0	0	0.29	0.41
2	0	0	0	0	0	1	0	0.14	0.24
3	0	0	0	0	0	0	0	0.00	0.00
4	1	0	0	0	0	0	0	0.14	0.24
5	2	0	0	0	0	0	0	0.29	0.49
6	0	0	0	0	0	0	0	0.00	0.00
7	0	0	0	1	0	0	0	0.14	0.24
8	1	0	0	2	0	1	0	0.57	0.65
9	1	0	1	0	0	0	0	0.29	0.41
10	0	0	1	0	0	0	0	0.14	0.24
11	0	0	0	1	0	0	1	0.29	0.41
12	0	0	0	0	0	0	0	0.00	0.00
13	1	0	0	0	0	3	0	0.57	0.82
14	0	0	0	0	0	0	0	0.00	0.00
15	0	0	0	0	0	1	1	0.29	0.41
16	0	0	0	0	0	0	0	0.00	0.00
Avg per test	0.44	0.00	0.19	0.25	0.00	0.38	0.13	0.20	0.29

Table A2-3. CFU per plate obtained in n=7 tests (16 plates per test) in an empty chamber with a breathing PAPR-wearing manikin (Control--manikin data).

Agar plate #	CFU per plate								
	Cm1	Cm2	Cm3	Cm4	Cm5	Cm6	Cm7	Average	St.Dev
1	0	0	0	3	0	0	1	0.57	0.82
2	0	0	0	0	1	1	1	0.43	0.49
3	0	0	0	0	1	0	1	0.29	0.41
4	1	0	0	1	2	3	0	1.00	0.86
5	0	0	0	1	1	2	0	0.57	0.65
6	0	0	0	3	1	2	0	0.86	0.98
7	0	0	0	2	1	0	1	0.57	0.65
8	1	0	0	1	1	1	0	0.57	0.49
9	0	0	1	1	0	0	1	0.43	0.49
10	0	0	0	0	0	1	0	0.14	0.24
11	0	0	0	2	1	0	1	0.57	0.65
12	0	0	0	3	1	0	0	0.57	0.82
13	0	0	0	2	0	0	1	0.43	0.61
14	1	0	0	2	0	2	1	0.86	0.73
15	0	0	0	0	0	0	0	0.00	0.00
16	0	0	1	2	1	0	1	0.71	0.61
Avg per test	0.19	0.00	0.13	1.44	0.69	0.75	0.56	0.54	0.59

Table A2-4. CFU per plate obtained in n=5 tests (16 plates per test) with unprotected subjects (two subjects operating in each test with no personal protective devices – established as “positive controls” – PC). *[Note: n=5 was chosen as a reasonable compromise between sample sizes of n=4 (initially set for the pilot study) and n=7 (enhanced in the extended contract); n=5 was sufficient to detect statistically significant differences between the tests involving protected and unprotected subjects.]*

Agar plate #	CFU per plate						
	PC1	PC2	PC3	PC4	PC5	Average	St.Dev
1	7	0	2	7	14	6.00	4.00
2	9	2	20	4	7	8.40	4.88
3	2	0	13	0	1	3.20	3.92
4	39	4	9	25	5	16.40	12.48
5	42	5	11	15	2	15.00	10.80
6	21	1	5	12	1	8.00	6.80
7	3	0	0	0	3	1.20	1.44
8	0	0	0	1	0	0.20	0.32
9	1	2	12	0	5	4.00	3.60
10	3	2	3	0	2	2.00	0.80
11	1	3	2	3	0	1.80	1.04
12	1	2	7	2	2	2.80	1.68
13	0	1	0	1	0	0.40	0.48
14	1	0	2	0	3	1.20	1.04
15	3	0	0	0	0	0.60	0.96
16	3	0	2	0	1	1.20	1.04
Avg per test	8.50	1.38	5.50	4.38	2.88	4.53	3.46

Integration of Respirator Protection into Practice Among Healthcare Workers Exposed to Influenza

NORTH CAROLINA

Final Report

October 28, 2013

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Table of Contents

Introduction	1
Project Purpose.....	4
Goals	5
Methods.....	6
Hospital Selection	6
Conference.....	6
Table 1 Respiratory Protection Conference Objectives and Agenda.....	8
Practice Champions	9
Checklist/Log Data.....	9
Box 1 Practice Champions	11
Table 2. Practice Champions Guidelines	12
Focus Groups	13
Focus Group Questions	14
Focus Group Questions with Prompts	16
Results.....	18
Conference.....	18
Table 3 Respiratory Protection Conference Evaluation Form.....	19
Pretest/Posttest Summary Analysis.....	20
Table 4a Summary Results of the Pre-and Posttest	21
Table 4b Summary Results of the Pre-and Posttest by Person.....	23
Table 4c. Comparison of Pre/Posttest Scores	24
Practice Champions	24
Dates and Locations	25
Observations.....	25
Table 5 Observations.....	27
Resolution.....	27
Table 6 Resolution	29
Referrals	29
Table 7 Referrals.....	30
Follow-up.....	30
Table 8 Follow-up	32
Focus Groups.....	32
Table 9 Focus Group Hospital Distribution	33
Hospital A1.....	35
Hospital A2	44
Hospital B1	49
Hospital B2	55
Hospital C1	58

Hospital C2	68
Hospital D1.....	73
Hospital D2.....	78
Hospital E	83
Hospital F1	87
Hospital F2	91
Summary of Each Focus Group Question	96
Description of Respiratory Protection Program	96
Description of Training/Education for Respiratory Protection Program	98
Care of Respirator	100
Recommendations for Improvement of Respiratory Protection ..	101
Knowledge and Skills Needed for Respiratory Protection.....	104
Discussion.....	107
Recommendations	111
Competencies for Respiratory Protection	113
References	116
Appendices	117
Appendix A Manual and Powerpoints	117
Appendix B Respiratory Protection Program Pre/Posttest	342
Appendix C Practice Champions Observation Checklist/Log Template	345
Appendix D Practice Champion Checklist /Log Data.....	346

Integration of Respirator Protection into Practice among Healthcare Workers Exposed to Influenza

Introduction

Each year in the United States there are about 36,000 deaths and 200,000 hospitalizations associated with influenza. Seasonal influenza disproportionately attacks the very young, the elderly, those with chronic conditions, or are immunocompromised. In 2008, more than 13.6 million workers in the United States were employed in the healthcare field with approximately 35% employed in hospitals, 23% in nursing and residential care facilities, and 17% in physicians' offices (BLS, 2009).

While droplet exposure is the known route of transmission, debate continues about whether influenza transmission is also via the airborne or solely the droplet route. Evidence shows that airborne exposure plays some role in the transmission of novel H1N1 influenza A virus, as seen in animal models and in outbreaks in humans. However, the extent of such transmission and how it compares with contact or droplet-spray exposure and transmission is uncertain (Shine, Rogers, & Goldfrank, 2009). Without knowing the contributions of each of the possible route(s) of transmission, all routes must be considered probable and consequential (IOM, 2008).

The risk of influenza to healthcare workers (HCW) is not a new concern. Among the many considerations for the health and well-being of healthcare workers are the questions about what types of personal protective equipment (PPE) (e.g., respirators, gloves, gowns, eye protection, and other equipment) are needed to fully protect these frontline workers (Liverman, Harris, Rogers, & Shine, 2009).

Healthcare workers have long relied heavily on surgical masks to provide protection against influenza and other infections. Yet, there are no convincing scientific data that support the effectiveness of masks for respiratory protection. Masks have proved to vary widely in filtration capability ranging from a 4% to 90% penetration of aerosol particles (Oberg & Brosseau, 2008). These masks – which are open on the sides, top, and bottom – may be useful in source control when worn by a patient, but even then there is evidence of particle escape around the mask's margins after a sneeze or forcible cough. Respirators, by contrast, at a minimum cover the nose and mouth and are designed to purify the wearer's air either by filtering it as it is breathed in or by providing an independent air supply (Shine, Rogers, & Goldfrank, 2009). N95 respirators filter out 95 to 99% of relevant aerosol particles and should be fitted to the wearer to achieve efficacy.

PPE works by acting as a barrier to hazardous agents. However, healthcare workers face challenges in wearing PPE that include difficulties in verbal communications and interactions with patients and family members, maintaining tactile sensitivity through gloves, and physiological burdens such as difficulties in breathing while wearing a respirator (IOM, 2008; Radonovich, Cheng, Shenal, Hodgson, & Bender, 2009). Still, healthcare facilities need to foster and promote a strong culture of safety that includes a commitment to worker safety, adequate access to safety equipment, and extensive training efforts that utilize protocols requiring specific safety actions and detailing the consequences for noncompliance with PPE use. Every effort should be made to ensure that healthcare workers wear appropriate PPE and these employees should feel uncomfortable when not wearing PPE during appropriate situations (Clever, Rogers, Schultz, & Liverman, 2011).

As reported in the Letter Report from the IOM (Liverman, et al., 2009), in the continuum of safety and infection prevention efforts in healthcare facilities, PPE is one of many important components. Following a hierarchy of controls – engineering controls, administrative and work practice controls, and PPE- is an important occupational and safety protection strategy that must be utilized in any organizational system such as healthcare. Engineering and environmental controls (e.g., ventilation, negative-pressure rooms, and isolation rooms) are considered the first line of defense as they are measures that protect or affect multiple workers and patients and do not rely on individual compliance. Administrative work practice controls include the policies, standards, procedures, and practices established within an organization to limit hazardous exposures and improve worker safety (e.g., patient isolation, hand hygiene, cough etiquette, worker immunization policies, training and education, and organizational commitment to creating and sustaining a culture of worker safety). PPE includes respirators, gowns, gloves, eye protection, and hearing protection which must be provided by the organization. All relevant work situations with the potential for infection risk (such as cleaning patient rooms and delivery of food) must be considered as exposure sources, in addition to direct patient care.

Furthermore, responsibilities are incumbent on the healthcare worker to adhere to health care facility unit safety policies and use proper hand hygiene practices and appropriate use PPE. Unfortunately, evidence for compliance of healthcare workers with these measures indicates that these effective measures are significantly underused, as are most types of PPE (IOM, 2008). Many factors, such as lack of time, lack of ready access to equipment, concerns about interference with patient care, and problems with comfort have been identified as contributing to noncompliance.

In October, 2011, a respiratory protection project (Respiratory Protection Program Evaluation in North Carolina Acute Care Facilities) was completed in 21 North Carolina acute care hospital facilities involving more than 400 healthcare workers to evaluate the use of respiratory protection for respiratory infection exposure among healthcare workers. The project involved an assessment of the written RPPs including each facility's written policies and procedures for respiratory protection; the proper use and adherence to OSHA's respiratory protection standards; the use of respiratory protection among healthcare workers (HCWs) including an observational component in a sample of participants; and HCWs' knowledge and beliefs regarding respiratory protection among HCWs and hospital management. Data obtained noted many positive findings; however, there were several deficiencies noted in practice and policy, and response differences between HCWs, unit managers, and hospital managers as previously reported.

Project Purpose

As reported in the IOM Letter Report *Occupational Health Nurses and Respiratory Protection: Improving Education and Training* (2011):

To best serve the health of nurses, workers, and the public, the technically oriented material must be paired with education on ways for nurses to protect themselves from respiratory exposures and hazards, the potential consequences of not using appropriate personal protective equipment, strategies for effective behavioral change and leadership, and strategies to build a culture of safety (p. 3).

The objective of this current project, Integration of Respirator Protection into Practice Among healthcare Workers Exposed to Influenza (IRPP), was to develop, implement, and evaluate an education and practice intervention that utilizes knowledge to improve practice for

respiratory protection in a sample of the previously participating NC 21 hospitals. Utilization of key personnel in the participating healthcare facilities was an integral component.

Goals for the project included the following:

GOAL 1: Develop an educational program for HCWs and management that incorporates core elements related to respiratory protection for influenza. This includes:

- Influenza transmission routes, hand hygiene, the value of respiratory protection in reducing illness and injury
- Hazard assessment, respirator selection and care
- Medical evaluation and monitoring
- Fit-testing, training, donning/doffing, seal checks, and return demonstration
- Program evaluation

GOAL 2: Describe strategies for effective integration of respiratory protection into practice and evaluate. This would include:

- Policy development
- Risk assessment
- Practice champions
- “Spot” checks

Goal 3: Evaluate effectiveness of the educational intervention and practice integration

- Pretest/posttest for educational knowledge
- Practice observational guidance
- Policy review/discussion

Methods

The principal investigator and key personnel met and reviewed data and information about the 21 hospitals who were in the 2011 respiratory protection project to determine hospital sample selection for this project; the conference purpose, content, speakers, and participants; practice champions; focus group purpose, selection, questions, and procedures; and competencies to be developed.

Hospital Selection

Based on the 21 hospitals participating in the 2011 respiratory protection project in North Carolina, 10 hospitals were chosen to be invited to participate in the IRPP Project. This was based on size (small vs. large) and location (rural/suburban vs. urban) and 6 hospitals volunteered to participate with this representation.

Conference

Materials developed for the conference were based on a review of the relevant literature, examination of North Carolina influenza data, the Hospital Respiratory Protection Program Toolkit, and the IOM Letter Report: Occupational Health Nurses and Respiratory Protection: Improving Education and Training. Conference objectives and an agenda (Table 1) were developed and expert speakers were identified and invited. Based on the location of the volunteering hospitals, a central location, the Friday Center in Chapel Hill, was identified for the conference to minimize travel for participants. A conference workbook and accompanying power point slides (Appendix A) were developed to include important information relevant to the topic:

- Purpose and Introduction
- Why Hospitals Need a Respiratory Protection Program

- Understanding Respiratory Protection
- Respirators
- OSHA Respiratory Protection Standard Developing a Respiratory Protection Program
- Appendices

Table 1. Respiratory Protection Conference Objectives and Agenda

INTEGRATION OF RESPIRATORY PROTECTION INTO PRACTICE AMONG HEALTHCARE WORKERS INTEGRATION OF RESPIRATORY PROTECTION INTO PRACTICE AMONG HEALTHCARE WORKERS May 30, 2013 William and Ida Friday Center for Continuing Education 100 Friday Center Drive, Chapel Hill, NC 27599	
PURPOSE: The purpose of this meeting is to provide information on respiratory protection for healthcare workers and to identify appropriate strategies for successful implementation of effective respiratory protection programs.	
TARGET AUDIENCE: Workers in health care facilities including, but not limited to, staff from employee health, infection prevention, safety/environmental health, nursing, respiratory therapy providers, management.	
LEARNING OBJECTIVES: • Discuss the importance of respiratory protection among healthcare workers • List respiratory protection program requirements • Describe how to fit-test for respirator use • Discuss gaps and deficiencies in respiratory protection programs at health care facilities • Identify strategies for implementing respiratory protection program at health care facilities	
AGENDA	
7:30	Registration
8:30	Introductions and Conference Purpose - Bonnie Rogers
8:50	Respiratory Protection for Healthcare Workers: Program Requirements Edie Alfano-Sobsey
9:30	Evaluation of Respiratory Protection Programs in NC hospitals - Bonnie Rogers
10:15	Break
10:30	Fit-testing Demonstration (qualitative and quantitative) - Pat Curran
11:15	Donning and Doffing Respirators - Pat Curran
12:00	Lunch Break
12:45	Joint Commission Tool Kit and Monograph for best practices - Debbie Novak
1:00	Panel Discussion: Strategies for Implementing Respiratory Protection Programs at Health Care Institutions and Best Practices with discussion from representatives of each hospital. Facilitator - Kathleen Buckheit
1:45	Next Steps: Focus Groups - Judy Ostendorf
2:15	Break
2:25	Practice Champions - Bonnie Rogers
3:00	Adjourn

Letters of invitation were sent to the six hospital contacts inviting up to eight participants from each hospital to attend the one-day respiratory protection conference “Integration of Respiratory Protection into Practice among Healthcare Workers” in Chapel Hill May 30, 2013. Hospital contacts were asked to invite a diverse group of hospital employees to attend the conference that included nurses, respiratory therapists, certified nursing assistants, industrial hygienists, safety and occupational health professionals, infection preventionists, and others involved with respiratory protection practice who would be appropriate to attend. Hospital contacts were also asked to invite participants who represented an array of hospital areas, such as the emergency department, intensive care units, pediatric units, medical-surgical units, occupational health, and other units that require the use respiratory protection.

To assess knowledge pre and post conference, a Pre/Posttest (same questions) (Appendix B) was developed that initially included 10 questions with multiple choice responses. Questions were developed based on the objectives and conference content. The pre/posttest questions were then tested on five individuals and recommendations for change were made. Participants were asked to complete the pretest prior to the start of the conference and again at the conclusion of the meeting.

Practice Champions

As mentioned above, letters of invitation to participate in the project and to attend the conference also included information on the recruitment of volunteers to act as “Practice Champions” for their hospitals. These Practice Champions were asked to make “spot” observations and contacts with users of respiratory protection encouraging good practice and also identifying situations needed for work practice improvement or correction. Observations would then be recorded on a template checklist/log (Appendix C) developed by the staff that

included date/location, description of the incident, resolution, referral if needed, and follow up. Volunteering Practice Champions were asked to have basic knowledge about respiratory protection (Box 1). Several telephone calls and Emails were exchanged with the hospital contacts to answer questions about the activities and training that would be discussed at the conference and the role of the Practice Champions.

Box 1.**Practice Champions**

- Know the institution's respiratory protection program
 - Written respiratory protection program
 - Responsible person
 - Hazard evaluation and respirator selection
 - Medical evaluation
 - Fit-testing procedures
 - Use, storage, maintenance, disposal of respirators
 - Training
 - Program evaluation
 - Recordkeeping
- Know what an aerosol transmissible disease (ATD) is and approaches needed to minimize exposure
 - Diseases/pathogens requiring airborne/droplet precautions
 - Droplet Precautions
 - Airborne Precautions
 - Contact Precautions
 - Vaccination
- Know when a respirator should be used and be able to differentiate between facemasks and respirators
 - Hazard evaluation/job task
 - Anticipated risk for exposure to ATD
 - Aerosol-generating procedures
 - Facemask
 - Filtering facepiece respirator
 - Powered air-purifying respirator (PAPR)
 - Respirator selection
- Know how donning and doffing a respirator is done, how to evaluate a respirator seal check, and how to demonstrate fit-test procedures
 - Who gets fit-tested
 - Procedure for fit-test

As part of the educational conference, all participants received information about participating as Practice Champions and were given the Practice Champion Guidelines (Table 2). The role of the Practice Champion was discussed in detail with an opportunity for questions and answers (Box 1).

Twelve of the 26 conference attendees from the six hospitals volunteered to participate as Practice Champions. Required information was discussed with each Practice Champion on

observing hospital workers about respiratory protection and documentation of observations and actions resulting from these observations. Practice Champions were asked to provide guidance and referrals to the occupational health or appropriate service for those who were not in compliance with policy or procedures designed to adequately protect them from exposure to respiratory contaminants. Several emails of encouragement and answering questions were sent throughout the observation period from June through September, 2013.

Table 2. Practice Champions Guidelines

Practice Champions Guidelines	
The role of the practice champion is to assist with identifying problems or concerns with respiratory protection in order to improve respiratory protection programs and practice. This will be accomplished through collecting data on respiratory protection practice using the Practice Champion Report Log. The focus areas of emphasis are emergency departments, pediatrics, and medical-surgical units, and other appropriate venues. If you choose to become a Practice Champion, please alert your Respiratory Program Administrator that you are involved in this project.	
1.	The time period for data collection will be June 1 through September 30, 2013.
2.	Practice champions should be knowledgeable about respiratory protection and its program and implementation at the institutions, specifically the hospital's written respiratory protection program, when and how a respirator should be used, and procedures for fit-testing, maintenance and storage, and training for respirator use.
3.	The practice champion may observe a specific incident (e.g., healthcare worker not wearing a respirator) or may be asked for guidance about respiratory protection. This incident, observation, or request should be recorded on the Practice Champion Report Log along with how the issue was resolved, if any referral was made (e.g., a re-fit-test), and follow up provided.
4.	Please reproduce the Practice Champion Report Log if you need extra sheets.

The final discussion at the conference included a presentation to all attendees on the role of the Practice Champions for respiratory protection and activities (Box 1) required of the Practice Champions for approximately 6 to 8 weeks. Over the course of about eight weeks, several Emails were sent to the 12 Practice Champions to encourage their activities and answer any questions that they had. One main question was what Practice Champions should do when arriving on units where no respiratory protection was required at that time. The Practice Champions were encouraged to ask the hospital workers to demonstrate use or answer questions about their respiratory protection equipment and practice when there was no need for use on those units. From these types of interactions they were able to uncover situations that required their assistance and additional referrals in addition to when they were able to find respiratory protection in use. Findings and actions were documented on the Practice Champion Checklist/Log provided to the attendees and discussed at the Conference which was sent to the Project Director at the end of September when project activities concluded.

Focus Groups

In order to gather specific information about the conduct and effectiveness of the respiratory programs within each hospital, focus groups interviews were determined as the best approach. Project key personnel developed the focus group questions (and prompts that would be used to encourage discussion).

The purpose and basic questions for the focus groups were:

Data gathering (or to gain knowledge) that can be used to

- Improve respiratory protection education and training opportunities for all healthcare workers (HCW)

- Provide input into proposed competencies, a combination of knowledge, skills, and behavior needed, for respiratory protection for HCW

Focus Group Questions

- Can you describe your respiratory protection program?
- Can you describe how you get your training and education in the RPP?
- How do you take care of your respirators?
- Do you have recommendations for improvements in your Respiratory Program?
- What knowledge and skills do you think are important for people to have who need to use respirators? In other words, what should healthcare workers need to know how to do, to properly use respiratory protection?

At the conclusion of the respiratory protection conference May 30, 2012, respiratory program coordinators were identified and contact was made with each of the six hospitals' respiratory program coordinators (recruiters) to discuss calling and/or emailing them within the next two weeks to schedule the focus groups. Two focus groups were scheduled at each of five hospitals and one focus group was scheduled at one of the smaller hospitals. Most of the focus group recruiters emailed the supervisors of the specific hospital departments/areas and the workers in the departments either "signed up" or were asked to volunteer. Follow up email or phone contact was done by the recruiter if more participants were needed. One hospital, in an effort to increase participation, purchased two movie tickets as an incentive to each participant. Focus groups were scheduled based on the convenience of the hospital needs. Coordinators were asked to invite healthcare workers representing pediatrics, medical-surgical, emergency, infection control and prevention, respiratory therapy, occupational/employee health, nursing assistants, management, laboratory, housekeeping and any others believed to be important to the organization.

Once focus groups were arranged, two key personnel who were experienced in doing focus groups conducted all focus groups. A tape recorder and microphone were used to record each group meeting and notes were taken by both key personnel. Prior to each meeting the microphone was tested from all sides of the conference table to be sure that each participant could be heard. All notes were documented and the tapes were reviewed to confirm the details of the notes.

Each focus group was conducted in the same way:

1. Upon arrival, each individual had a document at their seat with the focus group's purposes, ground rules, questions to be discussed, and contact person information.
2. Key personnel introduced themselves.
3. Each participant identified him/herself, job title/profession, and department in the hospital where he/she worked. No names were recorded or documented.
4. The focus group purposes were stated.
5. Ground rules were discussed and included
 - a. Names would not be taken
 - b. Each person would have an opportunity to speak
 - c. One person would speak at a time
 - d. Recording was being made so that comments could be correctly documented
 - e. Each session would last 1 – ½ hours
 - f. All comments would be used as aggregate data
6. The five discussion questions* provided above were reviewed (see prompts below).
7. Each question was discussed singularly with each participant having the opportunity to comment.

8. At the end of each question's comment period, participants were asked if anyone had anything else they would like to add to the comments.
9. At the end of the meeting, the group was again asked if they had any questions about the information discussed or any additional comments they would like to express.
10. The participants were thanked for their participation.

*The five questions with prompts are shown here:

Focus Group Questions with Prompts

- **Can you describe your respiratory protection program?**
 - Prompts:
 - Do you have a written respiratory protection program?
 - Where is the written program kept?
 - What kind of access do you have? 24/7??
 - If so, do you know what is in your respiratory protection program?
 - Describe how your RPP is evaluated?
 - What kind of input do you have into the evaluation process?
 - If you have questions about the RPP, where do you go for the answers?
 - What are the strength and weaknesses of your RPP?
 - Are there access barriers for adequate respiratory protection?
- **Can you describe how you get your training and education in the RPP?**
 - Prompts:
 - How would you define risk and therefore the need to use RP?
 - Did you complete a questionnaire about your health?
 - Can you describe a situation when you would put your respirator on?
 - Who trains you about respiratory protection?

- How often is it done?
- How long does it last?
- What is included in your training?
- What does donning and doffing mean to you?
- What types of jobs require fit-testing?
- How were you fit-tested?
- How often are you fit-tested?
- How do you do a seal check?
- When do you do a seal check?
- **How do you take care of your respirators?**
 - Prompts:
 - Describe what do you do with your respirator when you take it off?
 - Describe how do you clean it?
 - What do you use to disinfect the respirator?
 - Where do you store it?
 - What do you do if your respirator is damaged?
 - How do you know whether or not to reuse your respirator?
 - Where do you discard your respirators?
- **Do you have recommendations for improvements in your Respiratory Program?**

Part of the purpose of the focus groups is to develop competencies. Competence is a combination of knowledge, skills, and behavior needed.

- **What knowledge and skills do you think are important for healthcare workers to have who need to use respirators? In other words, what do healthcare workers need to know to properly use respiratory protection?**
 - Assess worker's physical and psychological fitness to wear a respirator

- OHNs that are well informed, engaged, and proficient in respiratory protection principles, practice and motivation.

Results

Conference

The conference was attended by 26 participants representing nursing, environmental health and safety, occupational health, infection control, and respiratory therapy from all 6 hospitals. Completed evaluations indicated a generally excellent satisfaction with achievement of objectives and content. An evaluation summary is shown in Table 3.

Table 3. Respiratory Protection Conference Evaluation Form

INTEGRATION OF RESPIRATORY PROTECTION INTO PRACTICE AMONG HEALTHCARE WORKERS

Date: 5/30/2013 Location: Friday Center, Chapel Hill, NC

I Please rate the effectiveness of this continuing nursing education activity.

Objectives Achieved	Excellent	Good	Fair	Poor
Objective 1 Identify the purpose of the Respiratory Protection Conference	20	2	0	0
Objective 2 List the components of Respiratory Protection Program in the Health Care	18	4	0	0
Objective 3 Describe the status of the Respiratory Protection use in NC hospitals	18	4	0	0
Objective 4 Describe the procedure of Respirator Fit-testing	19	3	0	0
Objective 5 Demonstrate correct method of donning and doffing Respirators	19	3	0	0
Objective 6 Describe the components of the Joint Commission Tool Kit for Use of Respiratory Protection in Health Care	14	6	1	0
Objective 7 Identify strategies for Implementing Respiratory Protection Programs at Health Care Institutions	17	5	0	0
Objective 8 Describe the process for conducting focus group meeting	17	3	1	0
Objective 9 Identify the role and responsibility of the "practice champion"	17	3	0	0

II. Please rate the audiovisuals/handouts used for this workshop.

Excellent	18	Good	1	Fair	0	Poor	0

III. Please evaluate the expertise of each presenter individually.

Presenter(s) Add rows if needed for more presenter(s) names.	Excellent	Good	Fair	Poor
Bonnie Rogers	19	3	0	0
Edie Alfano-Sobsey	19	3	0	0
John "Pat" Curran	20	2	0	0
Kathleen Buckheit	20	2	0	0

Debbie Novak	17	5	0	0
Judy Ostendorf	18	2	0	0

IV. Please evaluate the physical environment where the workshop was held:

Excellent	16	Good	3	Fair	0	Poor	0

V. How do you plan to use this information in your practice setting?

I will be better informed to give RN's and CNA's appropriate direction for protecting themselves.

Revising and updating our RPP.

Work with the fit testers of the various units. Update on paper use and education.

As an occupation health nurse, I perform fit-testing. This will allow me to be able to educate the people I see and ensuring that they are properly educated.

To include and share more instruction to coworkers.

I work in employee health and we do the fit-testing for our employees. It helped me gain better understanding.

Making sure each one knows the proper way to put on and removing respirators.

Become a practice champion. Learn how/who to evaluate our RP.

Update teaching of donning and doffing.

Will be able to check out site.

Monitor our unit to make sure employees are using the respirators correctly.

Using OSHA videos for teaching.

Refresher on Respiratory Protection and training for two new staff member in attendance.

To improve our RPP.

To review and develop policies for improving practice.

VI. General comments and/or suggestions:

Better informed! Thank you!

Great conference and information!

Great program!!

Very informative. Wonderful handouts and resources!

Pat Curran was very funny. I enjoyed listening to him.

This group of people made it fun but very educational even after lunch no one got sleepy because it was so much education out there.

Phenomenal learning/sharing experience! Thank you

Awesome! Very informative, fun, so glad to be a part of today!

This was very helpful in the information I received.

Make this a 2 day course. Great information

Great day, full of very useful information.

Pretest/Posttest Summary Analysis

The pre- and posttest was administered to 25 participants at the end of the day-long conference (one participant left early or did not complete). The conference content provided a varied approach to

presenting facts, scenarios, demonstrations, and discussions covering all topics of respiratory protection, especially on the use of N-95 respirators.

Participants were given the same ten-question test before and after the conference presentations within a 15-minute timeframe. As described in the methods section, there were initially 10 questions for the pre/posttest. However, the stem of question 8 was typed incorrectly and could not be answered correctly. Consequently, question 8 was deleted from the analysis resulting in 9 questions for analysis. The results of the questions asked are listed in the Table 4a. The results by person are listed in Table 4b.

Table 4a. Summary Results of the Pre-and Posttest

Questions	Correct Answer	Pretest Answered Correctly	Pretest Percent Correct	Posttest Answered Correctly	Posttest Percent Correct	Per Cent Change
1. An N-95 respirator should <u>not</u> be used to protect against which of the following respiratory hazards. a) TB b) Pesticides c) Measles d) Severe Acute Respiratory Syndrome (SARS)	b	21	21/25= 84%	25	25/25= 100%	16%
2. A medical evaluation must be done: a) Before the initial respirator fit-test b) If an employee reports medical signs or symptoms related to ability to use a respirator c) If there is a change in workplace conditions that may increase the physiological burden on the employee d) All of the above	d	22	22/25 = 88%	25	25/25= 100%	12%
3. The purpose of the fit-test is to: a) Determine whether an N95 or PAPR should be used b) Make sure the N-95 respirator provides a tight fitting face seal to prevent unfiltered air (particles) from getting inside the respirator c) To protect the patient from a healthcare worker with a respiratory infection	b	22	22/25 = 88%	21	21/25 = 84%	-4%

d) Learn about respirator reuse procedure						
4. Fit-testing is required: a) Annually b) Every three years c) Whenever a different model or size of respirator is used d) a and c	d	15	15/25 = 60%	21	21/25 = 84%	24%
5. Respirator users should check the seal of the respirator: a) Only before being fit-tested b) Every time you put on a respirator c) If the respirator feels loose d) Only after fit-testing	b	25	25/25= 100%	25	25/25= 100%	Same
6. Unused respirators should be stored to protect them from which of the following: a) Sunlight and extreme temperatures b) Excessive moisture and damage c) Deformation of the face piece and exhalation valve d) All of the above	d	25	25/25= 100%	25	25/25= 100%	Same
7. You must complete training about the respiratory protection program at least: a) Annually b) One time during your employment c) Every 3 years d) When you start a new position	a	22	22/25 = 88%	25	25/25= 100%	12%
8. Which of the following procedures are considered high hazard for exposure to aerosol transmissible pathogens: a) Sputum induction, bronchoscopy b) Pulmonary function testing , aerosolized medication administration c) Bronchoscopy, O ₂ administration d) a and b	d	21	21/25 = 84%	20	20/25 = 80%	-4%
9. Who needs to wear respirator: Employees who: a) Provide general home health care b) Change wound dressing c) Repair equipment that may contain aerosolized pathogens d) Work in the operating room	c	24	24/25 = 96%	23	23/25 = 92%	-4%

Table 4b. Summary Results of the Pre-and Posttest by Person

Conference Pre- and Posttest Results by Person					
Person	Pretest Correct	Pretest %	Posttest Correct	Posttest %	Posttest Results
1	7/9	78	9/9	100	Higher
2	7/9	78	9/9	100	Higher
3	8/9	89	9/9	100	Higher
4	7/9	78	6/9	67	Lower
5	8/9	89	9/9	100	Higher
6	8/9	89	9/9	100	Higher
7	8/9	89	9/9	100	Higher
8	8/9	89	9/9	100	Higher
9	7/9	78	7/9	78	Same
10	7/9	78	8/9	89	Higher
11	8/9	89	9/9	100	Higher
12	8/9	89	8/9	89	Same
13	7/9	78	9/9	100	Higher
14	9/9	100	9/9	100	Same
15	8/9	89	9/9	100	Higher
16	9/9	100	9/9	100	Same
17	9/9	100	8/9	89	Lower
18	9/9	100	9/9	100	Same
19	7/9	78	6/9	67	Lower
20	9/9	100	9/9	100	Same
21	9/9	100	9/9	100	Same
22	7/9	78	8/9	89	Higher
23	7/9	78	7/9	78	Same
24	8/9	89	8/9	89	Same
25	8/9	89	8/9	89	Same
Higher after Posttest			12 (48%)		
Higher or same score of 100% after posttest			17 (68%)		
Lower after Posttest			3 (12%)		
Scored 100% Pre/posttest			5		
Same after Posttest			5		
(minus those scoring 100% pre/posttest - 5)					

Of the 25 conference attendees who completed the pre- and posttests (n= 25), 10 (40%) participants' (10/25) scores were unchanged, including 5 (5/10) who answered all questions correctly for both the pre- and posttests. Respondents who scored the same or higher with correct answers on the

posttest numbered 12 or 48% of the respondents. Respondents who scored higher on posttest plus those scoring 100% on both pre and posttest numbered 17 or 68%. A lower score in the posttest was seen for 3 or 12% of respondents. A comparison of pre- and posttest scores is shown in Table 4c.

Table 4c. Comparison of Pre and Posttest Scores from Respiratory Protection Conference

Results of comparing pre-and posttest scores	Number of Respondents	Percentage
Better score on posttest	12 out of 25 respondents	48% of respondents
Better score on posttest and same 100% score from pretest	17 out of 25 respondents	68% of respondents
Same score on posttest. 5 scores = 100% on both the pre-and posttest	10 out of 25 respondents	40% of respondents
Lower score on posttest	3 out of 25 respondents	12% of respondents
Perfect score of 100% on posttest	15 out of 25 respondents	60% of respondents

Overall there was an increase of 48% in the scores by 12 respondents and 40% scores remained unchanged, including 5 participants scoring 100% in both pre-and posttests. Three of the 25 respondents scored lower in the posttest for unknown reasons. It was noted that at the end of an intensive day-long educational program, the participants were tired and eager to begin their travels home as many participants had travelled long distances from eastern and western North Carolina. This may have been a reason for rushing through the posttest to leave for home, which could account for the change from a correct answer in the pretest to an incorrect response on the posttest.

Practice Champions

A total of 216 individual and group contacts were observed and received training, education, or referral for respiratory protection by the Practice Champions. Observations/interactions and checking points were documented by Practice Champions on the Checklist /Log (Appendix D). However, some of the entries represented groups of workers and worker staff meetings, so the numbers are actually higher than listed on their logs.

Checklist/Log Data

A. Dates and Locations

A variety of locations within the facilities were used to conduct the Practice Champions' activities. Hospital workers who were observed during the project included nurses, doctors, nursing assistants, care managers, case managers, registration clerks, environmental health workers, and respiratory therapists. The observations were made from June to September, 2013 in patient rooms, on the units, and staff meetings. The Practice Champions documented 239 observations of or interactions with hospital workers using respiratory protection and their resulting interventions. The observations included the workers from the following areas: Emergency Department (ED), Security, Medicine ICU (MICU), Medicine Progressive Care Unit (MPCU), Various Nursing Units, Surgery/Trauma ICU, Pediatric ICU (PICU), Neurosurgical ICU, Bone Marrow Transplant Unit (BMTU), Intermediate Surgical Care Unit (ISCU), Main Operating Room Suite, Post Anesthesia Care Unit (PACU), Burn Center, ICU/PCU, Registration Staff in ED, Medical Units, Employee Health (EH), and Cafeteria. If patients were not on respiratory precautions, the Practice Champions could approach a random worker and ask questions and for a demonstration of that worker's use of respiratory protection.

Although 239 interactions were documented, many more individuals were involved as some of these represented staff meetings, multiple observations during procedures, and entire medical practices. When there were no respirators currently in use, the Practice Champions documented their activities of initiating discussions about respiratory protection with staff, asking for demonstrations of donning and doffing respirators, and holding awareness and training sessions about respiratory protection. Of the 239 documented situations of observations and interactions, corrective instructions included the following areas under observations:

B. Observations (Table 5) (e.g., not wearing respirator, improper donning/doffing)

1. Improper Use of Respirators:

Of the 216 observations or incidents documented, there were 164 categorized as “Improper Use of Respirators”. Incorrect donning and doffing, strap placement, and nosepiece pinching were identified in 103 observations. In addition, workers did not perform seal checks, 8 were observed not wearing the respirator, 6 wore the wrong type or size, and 7 wore surgical masks in place of the N-95 and did not understand the difference. Also 10 workers wore the N-95 with facial hair, 4 instances found incorrect storage, 2 workers were reusing their N-95s, 1 worker drew on the mask with a wet marker, and in 1 situation the patient was not placed on respiratory precautions.

2. Fit-testing:

Of the 30 observations that fell into the fit-testing category, 28 workers were not fit-tested or had not been fit-tested annually and needed fit-testing. Two workers failed the fit-test and were provided PAPRs.

3. Training/ Review of Policies/Standards:

With respect to training, 22 workers required training that included 8 workers who received updated overall respiratory protection training. Six respirator users were trained on fit-testing requirements, and five were trained on the cleaning, storage, and location of respirators. Two workers were counseled not to use respiratory protection if their blood pressure was high, and one worker was instructed on patient door signs used to alert workers of respiratory protection requirements.

Table 5. Observations

B. Observations:	
1. Improper use of respirators	TOTAL 164
Donning/doffing	70
Strap placement	20
Seal check / Fit check	22
Nosepiece fit in correctly	13
Facial hair with N95 use	10
Surgical mask interchanged with N-95	7
Wrong size/type N-95	6
Not wearing respirator/incomplete use before entering	8
Improper storage	4
Re-using N-95 respirator	2
Drew on mask with marker	1
Failed to place patient on respiratory precautions	1
2. Fit-testing	TOTAL 30
New Employee or Repeat Fit-test	17
Not Fit-tested	11
Failed Fit-testing	2
3. Training/Review of Policies/Standards	TOTAL 22
Updated training	8
Fit-testing	6
Cleaning, storage, location	5
Do not use when BP is high	2
Signage	1
Grand Total Observations/Incidents	216

C. Resolution (Table 6) (briefly describe action / guidance / resources provided):**1. Instructed on Proper Use of Respirator:**

From a total of 253 resolutions listed by the Practice Champions, 154 entries were categorized as needing training on the proper use of respirators. Within that category, 63 related to seal checks, 34 to strap placement, 23 for nosepiece adjustment, and 18 for donning/doffing. Proper disposal and storage guidance was given to 6 workers. Two workers were counseled as to the importance of completing the donning and completing the seal check prior to entering the patient's room. Eight workers had respiratory protection questions that were answered.

2. Guidance:

Guidance was provided to 18 workers for more information on fit-testing: 14 workers were counseled by the fit-testers; two workers by Infection Control/Prevention; one worker by Employee Health; and one worker by the Unit Manager.

3. Demonstration/Training Reviewed:

Of the 35 workers who required additional training on respirators, 25 PAPR and N95 users were trained on the reasons for respiratory protection and the use, care, and demonstration of the respirators. Eight workers needed to be educated on the use of signs on the patients' doors as to when to wear respiratory protection. Two workers were instructed on the techniques of using the N95 and to follow the manufacturer's instructions for donning and doffing and placement of straps.

4. Standards and Policies:

Of the 46 respirator users who received referrals and guidance for standards and policies, 24 were counseled on the OSHA Respiratory Protection Standard and Infection Control Policies. Nine men with facial hair were referred to the policy restricting their use of N-95 respirators because hair impedes the seal. Twelve workers were informed that they could not use a respirator without fit-testing, or needed to be informed of where the respirators were to be stored, obtained, and properly disposed, and one worker was educated about handling of suspicious cases.

Table 6. Resolution

C. Resolution (briefly describe action / guidance / resources provided):	
1. Training on proper use of respirator	TOTAL 154
Seal checks	63
Place/Adjust straps	34
Adjust metal nosepiece	23
Donning and Doffing	18
Answered questions	8
Disposal/storage	6
Complete donning/seal check prior to entering	2
2. Guidance	TOTAL 18
Fit-testers	7
Infection Control/Preventionist	2
Employee Health	1
Unit Manager	1
Discussed Fit-test requirements	7
3. Demonstration/Training Reviewed	TOTAL 35
Reasons/training for PAPR and N-95 use	25
Respiratory Protection Signs	8
Techniques/Follow N95 manufacturer's Instructions	2
4. Standards and Policies	TOTAL 46
Discuss OSHA Standard/Infection Control Policies	24
PAPR use only with facial hair	9
No use of N-95 without Fit-test/training	6
Location/use/storage of respirators	6
Initiate respiratory protection for suspicious cases	1
Grand Total Resolutions	253

D. Referral needed (Table 7) (e.g., Refit-test) (briefly describe): To whom? For what?

Of 63 referrals made, 27 were to fit-testers. Three departments are responsible for the majority of the respiratory protection training and the following referrals were made to them: 16 to Employee Health; 6 to Infection Control/Prevention; and 2 to Education. Four workers were referred to their managers or department staff; four were referred to review the hospital policies and OSHA standards; and four were sent to Central Supply for equipment.

Table 7. Referrals

D. Referrals:	
1. Fit-testers	TOTAL 27
2. Employee Health	TOTAL 16
3. Infection Control / Prevention	TOTAL 6
4. Training / Review of Policies / OSHA Standards	TOTAL 4
5. Manager / Department staff	TOTAL 4
6. Central Supply	TOTAL 4
7. Education Department	TOTAL 2
Grand Total Referrals	63

E. Follow-up provided (Table 8) (briefly describe/comments):**1. Education and Training**

Of the 124 Follow-up entries on the Practice Champion Checklist/Logs, 76 were concerned with education and training. Of these entries 41 involved re-education of workers on all aspects of respirator use: donning/doffing; strap placement; nosepiece adjustment; seal check; cleaning; storage; and disposal; 14 workers needed re-evaluation and return demonstrations of the respirator; 5 workers were instructed not to use N-95s with facial hair; 4 workers needed discussion about communicable disease exposure (TB); 12 workers needed a method of remembering their type and size respirator, a review of the importance of reading the isolation signs that identified required respiratory protection, an explanation of the reasons that respiratory protection is required and the diseases included, and to be counseled about proper disposal of N-95 respirators.

2. Referrals

Several referrals were made including 16 workers referred for follow-up for questions/concerns with Employee Health, Infection Control, and Management; 1 worker required discussion with management on the employee's re-use of N-95s; and 1 worker referral involved discussion with Employee Health about that Security Officers needing training on N-95s.

3. Fit-testing

Of healthcare workers observed, 22 were referred for fit-testing. Fit-testing requirements were reviewed for 6 workers that included the need for an annual fit-test or a new fit-test with any change in facial features, a weight gain or loss of more than 10 pounds, and when facial hair is removed and an N-95 will be used instead of a PAPR. Four workers were rescheduled for initial or repeat fit-testing. One worker failed the fit-test, but no resulting action was recorded and 10 workers achieved an acceptable fit factor after repeating the fit-test. One worker was not fit-tested as of the date of the report.

4. Training/Review of Policies/Standards

For review of policies/standards, eight workers received guidance. Directions were given to five employees to review the OSHA Standards and/or read the "Wear It Right" handout, and three workers were referred to Infection Control for infection precautions and isolation policies.

Table 8. Follow-up

F. Follow-up:	
1. Education and training	TOTAL 76
Re-education on correct use of respirators: donning/doffing, strap placement, nosepiece adjustment, seal check, cleaning, storage, disposal	41
Re-evaluated staff / return demonstration	14
No use of N-95 respirators with facial hair	5
TB isolation	4
Sticker/sample to remind of respirator type/size	3
Reviewed importance of reading isolation signs	3
Reasons to use respirators/hazardous diseases	3
Disposal /Do not re-use N-95 respirators	3
2. Referrals	TOTAL 18
Follow-up for questions/concerns with Employee Health, Infection Control, Management	16
Discussion with Manager on re-use of N-95s	1
Discussion with Employee Health on Security Officers needing training on N-95s	1
3. Fit-testing	TOTAL 22
Fit Factor achieved	10
Schedule for Fit-testing: Initial / Repeat	4
Annual Fit-testing requirements	3
Re-enforced Fit-testing requirements: change in facial features, weight loss/gain, removal of facial hair, annually	3
Failed Fit-testing	1
Not Fit-tested	1
4. Training/Review of Policies/Standards	TOTAL 8
OSHA Standards/"Wear It Right" handout	5
Infection Control policies	3
Grand Total Follow-up	124

Focus Groups

In the 6 participating hospitals, 11 focus groups were held each lasting about 1-1 ½ hours with a total of 72 participants. Table 9 shows the distribution of hospitals (A-F) and participant numbers and departments represented. Along with note-taking, each focus group was recorded and transcribed.

Table 9. Focus Group Hospital Distribution

HOSPITAL	PROFESSION	NUMBERS BY PROFESSION	DEPARTMENT REPRESENTED	NUMBERS BY DEPARTMENT
Hospital A (2 Focus Groups)	Safety IH	1	Corporate H & S Division	2
	Registered Nurse	6	Occupational Health and Safety	6
	Respiratory Therapist	1	Cardio Pulmonary	1
	Admin. & Technician	3	Infection Prevention/Control	1
	Medical Director/Family Medicine/Rehab Residents	1	Infection Prevention & Carolina Rehab	1
	Technician & Fit-tester	1	Main Campus	1
	Education Director	1	Emergency Room	2
	Occupational Medicine Physician	2	Med Surg	1
			Lab Services	1
Hospital B (2 Focus Groups)	Registered Nurse	5	Employee Health	1
	Respiratory Therapist	1	Infection Prevention	1
			Med-Surg	1
			Telemetry Cardiac/Med-Surg	2
			Cardio-Pulmonary Respiratory Therapy	1
Hospital C (2 Focus Groups)	Respiratory Care Practitioner/Technician	1	Peds to Adult Units	1
	Registered Nurse	10	Occupational Health Services	4
	Physician Assistant	1	Cardiac Intermediate Unit	2
	Area Tech (cleans rooms)	1	Environmental Services	2
	Infection Control Practitioner	1	Internal Medicine Unit-Kidney Floor	2
	Public Health Epidemiologist	1	Pediatric (KISS Oncology unit - Renal)	1
	Housekeeping Professional	1	Medical Intensive Care	2
	Respiratory Therapist	1	Emergency Room	2
	Medical Director	1	Infection Control/Prevention	1
	Care Partner	2	Cardiac Intensive Care	1
			PICU	1
			Pediatrics	1

Hospital D (2 Focus Groups)	Respiratory Therapist	2	Pediatric Neuro	1
	Registered Nurse	8	Emergency Room	1
	EMT - Paramedic	1	Adult Respiratory Care	1
	Lab Technician/Phlebotomist	1	Surgery & Trauma	1
	LPN	1	Emergency Room	1
			Infection Prevention	1
			Occupational Health Services	2
			Critical Care Transport	2
			Clinical Evaluation - Post-Surgery	1
			Clinical Education - Med-Surg Intermediate	1
			Pathology - entire hospital	1
Hospital E (1 Focus Group)	Respiratory Therapist	1	Laboratory	1
	Registered Nurse	8	Radiology & Angio Technology	1
	LAS Coordinator (specimen processes)	1	All hospital areas	4
			Step Down Unit	1
			Infusion Suite	1
			Intensive Care	1
			Med-Surg	1
Hospital F (2 Focus Groups)	Respiratory Therapist	1	Outpatient Clinic	1
	Industrial Hygienist	2	Environmental Health & Safety	2
	Social Worker/Case Manager	3	Lung Transplant Patients	1
	Clinical Support Tech (unit secretary/nurse's assistant)	1	Emergency Room/Services	1
			Inpatient Infectious Disease Service (Pts w/Respiratory Chronic Disease)	1
			Clinical Care Management - responsible for storage, tracking, etc. of respirators	1
Hospitals: 6 Focus Groups: 11 Participants: 72				

For each focus group, the five questions described in the methods section were explored with the participants. For each hospital (A-F) and focus groups (e.g., A1 and A2 for 2 focus groups), attendees by job title and department are identified followed by a recording transcription and documentation of focus group conversation.

Hospital A1

Attendees:

Job Title	Department
1. Respiratory Protection Program Administrator/Safety IH	Corporate H & S Division
2. Supervisor of all Hospitals ---Respiratory Fit-testers Testing Program/OHN	Occupational H & S
3. Respiratory Therapist & Director of Cardio-Pulmonary @ Lincolnton Hospital	Cardio-Pulmonary at CHS - Lincolnton
4 Administrative Assistant (hybrid of. Admin & Tech on the floor – Respiratory	Occupational H & S – CHS - Lincolnton
5. Director of Team Mate Health	Occupational Health Services
6. RN/Annual Respiratory Fit-testing for the Department	Infection Prevention
7. Health Care Technician (Hybrid Unit Secretary & Nurses Aid)	T & A Carolina's Main Campus
8. Medical Director/Family Medicine/Rehab Residents	Occupational H & S and Corporate Health
9. RN – Supervisor/Emergency Room	CHS – Huntersville & University

1. Describe your respiratory protection program

- Our RPP is based on protection from airborne infectious disease, not chemical contaminants
- The RPP uses a decentralized approach for training and education of end users for N95 respirators. Use department fit-testers, or train the trainer approach. They are taught to do the fit-testing, and then they go out to their various departments and fit-test the other folks. – Centralized training is through computer based training (ACE modules)

and then the hands on training is done when the department fit-testers do their part with instructions and fit-training

- There are 20-30 people in AM and same in PM classes for training for fit-testers
 - Use Qualitative testing – taught to fit-testers
 - Hospitals are set up on quarterly basis of fit-testing so all testing is not done at same time
 - 3M6000 or PAPR have to come in & respond to the Respiratory e-tool that the fit-testers use
- The I-9 OSHA fit-testers for managers is used for the managers to evaluate
- Manager of 20 respiratory therapists discussed annual fit-testing requirement
 - Yearly requirement to be fit-tested
 - System is getting better and is more user friendly
 - Three qualified to be fit-testers
 - They take it very seriously
 - 100% fit-tested by June 30th 2013 (This department's deadline)
 - Respiratory Protection badge with label on back identifying type of respirator fitted with and the size
 - All documentation is computerized and "Manager's Tool" much easier to use since no longer on paper, but now an e-tool
 - There is a problem if someone is out on FMLA because the test can't be done, so pie chart can have exceptions for people out of work
- There are three fit-testers for 100 in ER. The problem is the prn employees (20) to fit-test because they may not be there when fit-testing is done

- The eTool works well; it's better than keeping up with paperwork used to have
- Policies are located on Intranet:
 - Safety Management/Respiratory Protection-anyone can access it
 - Departmental fit-testers (DFT) kept up to date
 - Selections of masks and sizes are available
 - Wearers of PAPR and 3M6000 have to come to OH Services department to be fit-tested each time
- Northeast is the one hospital that has a portacount machine to use for fit-testing, but 99% are tested qualitatively
 - Initial fit-testing done at time of health assessment in EH on hire, and then decentralized and done annually on their units. Process in place to phase in more quantitative testing, which requires purchasing additional portacount machines
- Annual Training for everyone:
 - ACE Modules are Annual Continuing Education for the Respiratory Protection Program. All questions must be answered correctly for training to be marked as completed
- People who attended RPP Conference met and made decisions to modify some items needed to improve their program and work will be continued on that
- 175 staff members in one department. Fit-testing to be completed in 1st quarter, by 3/31 and if you are not fit-tested, you cannot work. ER Registration staff is included. Meetings to set goals to get all staff tested were held and the training online was much better
- With regard to Online Tools: Manager Tools

- Committee got together and made list of over 2000 job descriptions to identify those who needed to be in the RPP
- Those needed to be included in the RPP were identified on the Respiratory Fit-testing Designation Management Tool
- Managers access the tool online
- First page is the reason that anyone needs to be tested....if person falls into any one of 7 or 9 categories, the manager clicks on yes and they will be included in the program
- This tool can be used to show how many employees are compliant with annual fit-testing. This number is illustrated in a pie chart at the bottom of the form
- Form includes the type and size of each person's respirator. The fit-tester enters information online and info is automatically downloaded into the database
- On the form, in the cue anyone who needs to go to CHS for PAPR or 3M6000 fit-testing can be found
- The manager submits "Reviewed Annually" form for Joint Commission Accreditation and OSHA Compliance
- Any lab workers who are exposed are fit-tested annually. They may go to other floors to do blood draws and need to use RP
 - If employee is not fit-tested every year, the employee can't work
 - The negative pressure rooms for TB and employees use Respiratory Protection
 - If teammate acquires TB, it is a red flag

- There have been 3 TB cases in last 18 years and when researched, only one was healthcare related. Viewed as an opportunity to improve the program
 - When TB converters occur must research conducted about where it occurred and use this as an opportunity for improvement
 - Provide treatment
- No varicella, pneumonias, or communicable diseases that were occupational related have occurred
- Infection Prevention also fit-tests all RP users annually in June with make-up dates for full-time employees
 - Do the 8 modules annually to keep up with changes
 - Fit-testers, RN & support person plus 3rd person who is new. The department specialist enters E form data....Train the Trainer
- Questions about the program goes to Employee Health Nurses (Teammate Health Nurses) (new name for EH)

An OHN has been assigned to each hospital facility
- One nurse is supervisor of the Respirator Fit-testing Program
- Manager's Tool provides manager with compliance snapshot for folks in their department
 - It shows gaps with overall system (CHS) compliance
 - It uses the information and data that management enters to populate the system used by the fit-tester

- A wish list for the information system is to be able to develop compliance reports for locations and facilities in the Carolinas Health System (CHS) instead of individual departments. This has been deemed a regulatory issue, so it has been moved up on the list of priorities

2. Describe how you get your training and education in RPP?

- There is a master list of 1400 trained Departmental Fit-testers (DFT). They take an initial training and they are the only ones who can sign off on an eForm. They complete the ACE modules online before they have initial training in the OHS on fit-testing that is required before they can sign off on training others. Re-training annually is done on the computers on how to fit-test end-users. They are working on a process to improve the re-training aspect
- Not everyone has a personal computer (PC), but there are rooms where the staff without computers can access the online training programs (ACE Modules). This includes those employees like the Environmental Services (housekeepers, etc.)
- The online training takes 15-20 minutes with videos included
- In the ER, the training to the Registration Staff includes when to put someone on respiratory precautions and start using respiratory protection
- Donning and Doffing- described as putting on and taking off respirators
- Seal Checks are performed every time the mask was put on, when moving around a lot, when laughing, smiling, talking a lot, or other reasons seal could be broken
- A meeting for RPP training at CHS-Union was held for the eTool for Managers. The managers delegate those who will be the Departmental Fit-testers (DFT). A separate training program by the OHN Fit-testing Supervisor and the Corporate RPP

Administrator (Safety) will be presented to the DFT to include videos, online, and hands-on training

- There is a corporate web page with information on Respiratory Protection available to staff members
- Improvements need to be made to ensure that the DFTs are providing consistent fit-testing and RPP training and that the communication with the DFTs is improved
- Annual PAPR training is conducted at OHS and not by DFTs

3. Care of Respirators

- Disposable Respirators/N-95s
 - One-time use every time they enter the patient's room
 - Some participants stated that they re-used the N-95, but others stated that is not the policy
 - No maintenance required
 - Stored in carts near the patient's room and carts are restocked after use and before being put away
 - Different sizes are available that are most commonly used
 - Disposed of in anteroom trash
 - Assistant Nurse Managers (ANM) can provide and/or order additional or different size respirators when needed from Distribution Center
 - Respirators had been used that were re-usable and stored in paper bags, but that is not done. They are disposable now, used one time and discarded after use in ante-rooms
- PAPR and 3M 6000 (half-face respirators)

- Owner is responsible to clean, maintain, and store own respirator
- Disinfected by using Super Sani-wipes (purple) approved by Infection Control.
Some types of Sani-wipes (orange) contain bleach, which can cause a film, so they are used only for GI infections, like C-diff and viruses, not respiratory contaminants
- Stored in lockers, cabinets in ante-rooms, or in storeroom with owner's name in plastic bag and plastic tote container
- Manager can order new ones

4. Recommendations for improvements for the RPP

- From an end-users perspective, the RRP gets better every year
- The program is more enhanced with great improvements
 - As an improvement, fit-testers should receive annual fit-testing training to ensure continuity of the fit-testing and training. It is an improvement to have the fit-testing done in the department where the employee works by the DFTs
- Fit-testers also may bring in people to be Junior Fit-testers to assist in the process and engage them in the RP Program
- OH Services fit-test people every day for new employees
 - That daily exposure to saccharine and bitrex testing seems to affect the staff who are exposed
 - Some have asthma and allergies to saccharin and bitrex, so fit-testing must be done on days that they will not be exposed.
 - They plan to gradually phase-in the use of Portacounts for all OHS locations doing fit-testing (has 8 locations now)

5. Knowledge and skills needed for use of respirators

The knowledge needed is

- When to put people on respiratory precautions at the suspect level – be proactive
- Why they need to be fit-tested
- Why they need to wear a respirator
- How to do it all to protect themselves
- What the health impacts are from exposure to infectious agents
- The negative pressure room is only one aspect, so wearing respiratory protection is vital
- Fit-testing is done for a specific model and size and respirators are not interchangeable
- How to perform donning and doffing properly – straps placed properly
- To do the seal check every time the respirator is used
- Staff needs to be more vigilant in putting people on respiratory protection precautions
- You are putting yourself at risk if you don't use respiratory protection properly when needed for staff and patient safety
- The mask is your tool. Use it and don't cut corners
- Who to notify and when if more respirators are needed

With teaching fit-testing,

- Fit-testers need to teach it right every time
- Be consistent with what is being taught

Hospital A2

Attendees:

Job Title	Department
1. RN	Infection Prevention & Carolina Rehab
2. Emergency Room Technician	CHS at Pineville ER
3. HC Technician (Combination Unit Secretary and Nursing Assistant)	Med-Surg Main Hospital
4 Director of Team Mate Health	Occupational Health Services
5. Team Mate Technician & Fit-tester	CHS at Northeast OHS
6. Education Director	Lab Services
7. Occupational Medicine Physician	CHS at Northeast

1. Describe your respiratory protection program

- Infection Prevention conducts annual fit-testing, utilizes DFT competencies, and ACE Modules for training and education
- Written program is online. Program and updates can be accessed on line at People Connect.
- Fit-testing done annually but difficult to get third shift people tested. Written manual somewhere
- Online policy for RPP in the Safety Management Program Manual is accessible to 95-98% of teammates – they have access to computers. Kiosks available in HR Centers & Nursing units for those who do not accessibility to computers
- OHS Fit-test Supervisors are available to answer questions
- Initial fit-testing is done on all employees in Team Mate Health (OH Services).
 - Follow-up done in departmental units
 - Quantitative testing done at Northeast
 - All other departments use Qualitative testing
 - 3M6000 or PAPR follow-up testing continues to be done at Team Mate Health
- Options for respirators follow OSHA Guidelines
 - First fit-test done with medical evaluation

- If yes to any of the questions process in place to manage that
- The Manager's eTool – identifies who needs to be protected by Respiratory Program
 - Shows compliance rate
 - Manager decides who will need to be fit-tested –all information automatically downloaded to data base
 - Currently working with IT on system and facility compliance development in order to obtain campus wide information from the information already in the data base
- Annual Testing – Teach Departmental Fit-testers (DFT) and also offer a review class one day for one hour for any changes from year to year
 - Proper donning and doffing
 - In Team Mate Health constantly doing it (because they test all new employees) where DFTs do it once a year
 - TM Health is having some problem with fit-testing (tasting, etc.)
 - Have some Portacounts, but not enough. They need to be used for fit-testing when people have problems with taste, asthma, or those who are claustrophobic
- Two DFT in Lab where 35 – 40 employees are tested
 - Lab employees go to clinics and do testing who may have exposures
- Departments involved in the lab that require fit-testing commonly would be histology, anatomic pathology, phlebotomy, microbiology, exposures in nursing homes, and out-patient lab. Anyone in lab with patient contact, bone marrow collection, slide pushing, assisting oncologists would be included in fit-testing
- It is a department policy, part of Lab SOP Manual – Staff required to review annually to meet Safety and College of Lab Pathologists accreditation standards and also CHS Global Policy

- A video is used for DFT and it reiterates mask placement for review classes
- MD said they have an excellent program that is well administered
- There have been no significant issues getting people cleared and fitted
- It seems to work pretty well
- There have been zero occupational conversions for TB

2. Describe how you get your training and education in the RPP

- Department Fit-testers
- There are two ACE Modules
 - One for everyone
 - One for DFTs
- Northeast has review class
- People Link – online information provided by Corporate Safety and anything new or changed is updated online
- This is all set-up well and is working well
- Replacing Respiratory Protection
 - Each unit has PAR (level of normal usage) carts for supplies and are replenished regularly
 - Each isolation room has an ante room, which is replenished regularly and if needed can call materials handling or another department to borrow
- Donning and Doffing
 - It means putting on and taking off masks
 - Employees taught to do a seal check every time respirator is put on
 - Pineville has 140 patients (had only 80 a few years ago)
 - Gaps are identified with DFTs and goal is to increase DFT training this year
- Replacement of N95 (Duckbill and Teal – stored at desk without a bag for cover)

- Every time in and out of the patient's room, replace N95
- At Pineville told to replace only when soiled or wet
- Under study
- Disposal of N95's
 - Disposed of in trash bags in ante room
 - Bag tied up at end of each shift
- Access to masks
 - During annual fit-testing may delay getting masks, but usually not a problem – try to call ahead to have more for annual fit-testing
- PAPRs come from Central Distribution & Medical Equipment Department. Call for delivery
 - Used for a shift, then clean and send back to Central Distribution/Medical Equipment Department

3. **Care of respirators**

- While in use, clean with Sani Wipes (purple lid) or clorox wipes and wipe each time leave patient's room
 - Send back down to Central Distribution/Medical Equipment Department after it is cleaned
- If PAPR is damaged, there is a kit that goes with the PAPR that has a checklist.
 - Identify on the checklist what is wrong with PAPR
 - The checklist guides them to return it to Central Distribution/ Medical Equipment
- The checklist also guides the user the proper way to “don” the PAPR

4. **Recommendations for improvements in RPP**

- Currently the 3M6000 is shared; everyone should have their own
- Currently stored in Patient Care Coordinator's (PCC) office and unit supplies stored there, not PAR carts

- Stored in bag it comes in
- Has not observed sharing of 3M6000 respirators
- Employee's made more aware that RP can save their lives
- Language barrier (Environmental Services) (Pineville location)
- Move to Quantitative Testing and away from bitrex and saccharine

5. **Knowledge and skills needed for use of respirators**

- The Fit-testers should tell you how to keep yourself and patient safe
- When RP is needed (like the lab & ER departments) sometimes there may not be a sign in the room – need to be more vigilant and proactive
- Some specimens, like acid fast Bacterium are dangerous
- If there is suspicion of TB in the ER, an N95 should work
 - The nurse can implement signage for 24 hours if diagnosis is not definite, but seems that it may be infectious
- Danger in not knowing about post-exposure meningitis

Hospital B1

Attendees:

Job Title	Department
1. RN	Infection Prevention (Control)
2. RN	Employee Health, Training & Development
3. RN	Med-Surg
4 RN	Telemetry Cardiac/Med-Surg
5. RN	Telemetry Cardiac/Med-Surg

1. Describe your respiratory protection program

- RPP is in the Policy and Procedures Manual, which is online and all hospital employees have access
- N95 and PAPRs are used for airborne diseases and isolated patients
- The hospital has negative pressure rooms. Each unit has one negative pressure room (isolation) and ICU has two negative pressure (isolation) rooms
- Questions about RPP are answered by infection control nurse (Sara) and employee health nurse (Mary). Can also call materials handling for materials
- Any questions about anyone possibly needing to be isolated before diagnosis confirmed may call Infection Control
- Two new hires talked about the “excellent” education they received in Employee Health about the RPP, including the policy itself and respiratory protection. They were fit-tested, shown the “helmet” and discussed policy and how to use the respirators. This was done even before orientation and working in the hospital.
- Fit-testing done initially upon hire and then annually
- Memo is emailed for employee to sign up OR they do not get to work (the consequence)

- Portacount used for quantitative fit-testing on in Employee Health
 - Volunteer purchased 3 Portacounts over time
 - Staff can do three Fit-testings at a time
- Infection Control (Sara) gives a 30 minute class at this initial education on RPP and discussing all types of isolation and what to do if airborne isolation room has no N95's that are the size needed. If not fit-tested must wear a PAPR
- Stickers on the name badge with the size and type of respirator and expiration date of fit-test are provided to each employee
- The hospital has 38 PAPRs in various locations. The PAPRs are designed so that if a filter needs changed a light goes off, if battery needs replaced another light goes off – Infection Control changes it
 - Three located in each airborne isolation room and 3 are in Employee Health for testing, 4 are kept in ER
 - Every 6 months EH and IC inspects the PAPRs, cleans and replaces parts (felt strips, etc.) and changes the filters annually whether or not the light indicated change is needed. Logs of these inspections and parts changed are kept
- No barriers identified to RP or to replacements of N95s...all sizes available; if not in unit, may need to go to next pod, CCU, or call Material Handling

2. Describe how you get training and education in the RPP

- Training and education in the RPP is first done on hire, includes BBP, isolation, what is event of exposure
 - Initial training uses slides, "horror articles", lecture, and discussion
 - Annual training is online

- Test out option in place
- If need to go through training, takes 15 minutes
- Has a posttest that must be passed
- Credit automatically given when test is passed
- Managers check to see if mandatory education completed prior to review with employee
- May also provide training at either Oktoberfest or Spring Fling, depending on needs indicated in previous 6 months; i.e. RP activities such as taking apart, cleaning and putting back together a PAPR
- Seal check is to be done every time respirator is donned
- Respirators needed infrequently
- N-95 per patient per day
- Policy states when not a Pandemic situation, to dispose N95 every time it is used
 - Dispose in trash can in ante room
- The policy specific to a Pandemic is one N95 per patient per day
 - May be stored in Ante room
 - Separate from everyone else
 - Name on bag and put on shelf
- Some choose to change respirator each time exit and reenter room and or change patients
- Use of respirators identified by job categories/risk exposure. Anyone going into a room
 - Nurses fit-tested
 - Facilities workers wear PAPR

- Housekeepers wear N95s
- How is determination about who is required uses respirators
 - Anybody going into an isolation room
 - Exposure to patients
 - Basically job categories and exposure potential
 - If TB, everybody uses
 - Last year in Alamance County there were no TB cases
 - In previous year in Alamance County, there were 6 cases
 - Last year ARMC had no cases of TB
 - In previous years, 3-4 cases
 - Considered a low risk facility
 - Active Shingles
 - Flu
 - Contagious illness
 - Suspect-proactive, Infection prevention
- If not fit-tested, encouraged to do PAPR training
- Admissions staff fitted with N95s and even trained to use PAPRs
- PAPRs cleaned with super-sani wipes/cleanse with purple lid
 - Clean outside hood
 - Clean inside the bouffant hat
 - Change felt strips, if soiled
- PAPRs stored in ante room on shelves

- Currently in a CDC four phase study with UNC and Duke using Ultraviolet light disinfectant to clean room after patient discharged from isolation room (Housekeeping cleans room initially)

3. Care of respirator

- Each isolation room has an ante room
 - Respirator should be donned and doffed in this room
 - Stored in ziploc bag with name and placed on shelf
- Policy states to dispose N95 every time it is used.
 - Dispose in trash can in ante room
- PAPRs cleaned with sani wipes/cleanse with purple lid
 - Clean outside hood
 - Clean inside the bouffant hat
 - Change felt strips
- PAPRs stored in ante room on shelves
- In ICU there is not an ante room, so use cabinets outside of area
- For PAPR repair, replacement, etc. call Materials Management or can go to next room to get one. Always 3 available in each area
- EH do all fit-testing and training
 - They also provide a handout on How to donn and doff and assemble PAPR

4. Recommendations for improvements in RP

- The RP users stated that they think their RPP is “pretty good”
- Training and class is fine – maybe need reminders (may get “rusty” if don’t use RP in a while). If have questions, just call EH or Infection Control

- Review policy and PAPR use
- Visitors need to be educated and RP enforced
- Review RP, especially PAPR because it is used infrequently
- Possibly review the policy 6-9 months after hire, maybe during a staff meeting because have so many policies taught initially on hire
- Infection Control post slides to intranet site
- Educations slides can be accessed for review
- Unit base competency fairs can be done – refresh knowledge at fairs
- Isolation signs to tell visitors and staff what PPE required

5. Knowledge and skills needed for use of respirators

- Basic knowledge of how to donn and doff
- How to do proper seal checks and when to do the check
- Why you need to use RP
- Hand washing aspect is very important after taking off N95 or PAPR
 - There are sinks in every anteroom
 - There is hand gel for cleaning inside and outside every patient's room
- Employee Health RNs, Adm Assistant, and a Med Tech (part time) are trained fit-testers
 - There are no department based trainers anymore because of poor compliance; there was many years ago
 - 2200 employees in hospital
 - 700-800 are fit-tested
- Mandatory flu vaccine---or voluntary resignation is a policy

Guillain-Barre is a contraindication

Hospital B2

Attendees:

Job Title	Department
1. Respiratory Therapist	Cardio-Pulmonary RT

1. Describe your respiratory protection program

- Respiratory Fit-testing and Training are done in Employee Health
- Fit-tested with respirators to make sure fit good
- Provided a pamphlet to keep that illustrates and describes donning and doffing
- N95 is what is typically fitted with
- PAPR's are rarely used
- On initial fitting and training, each employee gets medical clearance, after that only sent for medical clearance if response to questionnaire indicates a need
- Fit-tested annually
- The job description, department supervisor, and employee health identifies and notifies people needing fit-testing
 - In negative pressure room, there is a storage cabinet
- Doesn't know "there is a specific manual about the RPP, but there must be"
- Not sure about evaluation of the program

2. Describe how you get your training and education in the RPP

- Trained annually in EH
- Face to face training

- Annual testing and training takes about 30 minutes
- How to don and doff the respirator and proper placement of straps
- Respirator must be tight on nose so that there is no air leaking around it
- Check seal every time put mask on (when donning)
- When mask gets wet, there is no longer protection
- Told to report changes in face that might affect fit of respirator, such as gain or loss of weight or growth of beard, to EH
- Use fresh mask every time you enter the room and discard when leaving the room – in regular trash can inside the room
- Fresh N95s are always available and if not in specific size not far to get one from next room's table in ante room or next department. There are also extras in supply room on the floor. They are not hard to find
- Can always call "Central Supply" for additional sizes, masks, and probably PAPRs
- If in ER and someone has cough, flu like symptoms, or symptoms of pneumonia, would use RP
- N95s do not have to be stored because they are replaced each time a room is re-entered

3. Care of respirators

- Use of antibacterial wipes - many parts of the PAPR are disposable and are replaced
- Most employees fitted with N95s, so don't need cleaned

4. Recommendations for improvements in the RPP

- Training is good

- Signage on door to patient's room may not be good; may need to identify that mask needs to be worn for this patient's room, but sign not there –doesn't happen often, but just occasionally
- No problem with respirator availability

5. Knowledge and skills needed for use of respirators

- They need to have a good fit and a good seal with no leakage
- Must be positioned properly
- Continue good training initially and annually
- It is everyone's personal responsibility to use RP properly

Hospital C1

Attendees:

Job Title	Department
1. Respiratory Care Practitioner/Technician	Works on several units – Peds to Adults – all pulmonary issues (trachs, ventilators, etc.)
2. Care Partner/Respiratory Fit-tester	Occupational Health Services
3. RN	Cardiac Intermediate Unit – 8 isolation Rooms + 4
4. Area Tech – clean rooms	Environmental Services Floor Tech
5. Care Partner	Internal Medicine Unit – Kidney floor
6. RN	Pediatrics (KISS – Kids Immuno-Suppressed Specialty oncology unit-renal
7. RN	MIU
8. Infection Control Practitioner	Cardiac
9. RN/Staff Nurse	Emergency Room
10. Public Health Epidemiologist	Infection Control – Pandemic flu planning

1. Describe your respiratory protection program

- The Respiratory Protection Program Protocols and Procedures are on the intranet and available to staff 24/7
- For special isolation cases, meetings are held and they are reminded how to protect themselves and the patients
- If anyone has questions about RP or the RPP, they are to ask their supervisor or manager, or the charge person
- Regulatory training is done when hired and then once a year – Computer Based Training (CBT)
 - On initial test, when hired medical evaluation

- After initial medical evaluation, questionnaire is reviewed and if there are any “yes” responses, there is a protocol to follow
- Fit-testing done annually in Occupational Health for N95s
- Annual fit-testing done. If we have any question about what “protection” to use if isolation is needed for a patient, (shingles), we check Infection Control online to verify what should be used
 - There is a barrier to getting a PAPR. Stockroom has a short supply, but one was found on the unit and they returned it to the stockroom
 - They do what they “need to do” as far as being sure they are protected and the patient is protected
- Every room is different. If go into an airborne room or contact room must follow precautions
 - There is an anteroom, before you go into the patient room, I take everything I need into the room with me the first time to protect myself and the patient and to limit the back and forth of entering and leaving the room
 - One individual shaved his beard before fit-testing so that he would be able to wear an N95, but lets the beard grow back and continues to wear the N95
 - If someone comes into OH with a beard, he is passed only for a PAPR and is given a slip with PAPR only written on it
 - OH reinforced that an individual with a beard must only use a PAPR and not an N95 to protect himself and the patient
- Internal Medicine/Kidney floor has two hallways that are called Isolation Hallways

- N95s are kept in the cabinets, but we seem to need bigger cabinets for respirator storage, so that visitors “stuff” isn’t interfering with the nurse’s kits in the cabinets.
- Use N95s mostly – use hand washing signs on doors and paper towel holder
- Protection information on the internet
- Before getting annual evaluation, employee must get fit-tested and complete the annual CBT
- We don’t see too much TB or airborne, but do see flu and Respiratory Symptoms Virus (RSV).
 - Encourage families to use protection if visiting someone with airborne or droplet spread diagnosis – they sometime ignore signs on door
 - We encourage/offer flu shots to all families and ask if patient wants a flu shot on admission
 - Last year during flu season the hospital allowed no visitors under the age of 12 due to having so many cases
- MIC sees everything---TB, meningitis, flu. We have 4-6 isolation rooms on our floor
 - Sign on door about protective equipment needed for the room
 - Annual fit-testing for the N95 is done
 - Offer flu and pneumonia vaccinations for people of certain ages, upon discharge
 - Uses “hood” for TB; have 2 “hoodies”
 - Have surgical/procedure masks outside the room
- Have 125 isolation rooms in the hospital so the infection control department is always monitoring those
 - Infection Control plans within each of the different isolations

- We have one isolation plan that includes droplet, contact, and airborne
 - In addition we have a TB plan that covers all of the airborne type diseases.....it includes all the CBT training requirement, supplies needed to be on hand at each of rooms
 - One thing seen is that there is no standard place to store supplies
 - Sometimes we get a call because they have no N95 masks available and Infection Control needs to get the masks for them
 - There is a need to standardize throughout the house – visitor supplies need to be separate from the nurses’ supplies – sometimes we see visitors wearing N95s and that causes the shortages
 - We get calls because some things are not clearly defined...like what RP required for shingles
 - We do a good job with flu, SARS in years past, but it’s in between that there are gaps and the training may become lax
 - Real problem in the ED with a patient coming in with hemoptysis and a week later find them on unit, after they have a positive AFB, then we have to do an exposure investigation. That happened a number of times last year. TB cases are going up here
 - When we moved to North Tower, we lost some negative pressure rooms, which are what we have to have for TB patients
- If someone has a question about RP or the RPP, they call Infection Control or they go to their nurse manager

- If someone needs supplies, they can call directly to Central Supply – but they shouldn't have to call
 - Audits are done frequently and they find the definition of “accessible” is different. To the nurses accessible means in the Pyxis and to Infection Control it means right there in an unlocked cabinet by the door to the patient's room
- The OHN requested a list of what Infection Control thinks needed worked on and she said they would make it happen
- Policies and CBT are on line
 - Rolling carts (isolation) have everything on them in the way of equipment, except the PAPRs
 - In the ED the deficiencies are early identification and early initiation of the RP
 - Respiratory Therapists are assigned to the ED all the time
 - They are a huge help. Best to initiate the precautions – better than nurses
 - Need education to help staff identify any medical issues where a new patient would need to be placed into respiratory precautions
 - Best Practices – triage
 - If someone comes in with a sore throat and suspicious of strep, the nurse can do a rapid strep test and send to lab
 - Prompt comes up because of test ordered-do I want to place the person in respiratory isolation because of order put in
 - Would be good to expand to include more things to prompt to check for respiratory isolation protection

- Good to put into education – it is one of the nurses responsibilities to enter a protocol order for isolation if they think it is necessary, until it can be reviewed
- One idea is that the respiratory therapist could put a protocol order in to use respiratory protection/isolation, if they themselves are using it.
- Early isolation or recognizing symptoms and isolating based on symptoms are important
 - Even if patients are not on isolation, there is still potential danger; need to be aware that germs are everywhere and disseminate that information
 - We usually do big media things at start of flu season. One of the MDs will put an op ed piece in the newspaper.
 - Newsletter send out to the staff
 - Hand hygiene
 - Last year the flu season was the worst in the last decade
 - Make decision year to year what to do....visitors were restricted last year
 - Monitor employee illnesses – collect data from OH, Infection Control, ED and warn staff that the flu season is starting
 - Watch for RSV, too
 - Any time change in status newsletter goes to staff
 - Last year had two flu seasons: A started November and peaked in January; then B started in late November
 - Last year was first year for mandatory flu shots as condition to employment (83%)
 - Religious exemptions
 - 12,000 employees and had 200 exemptions.
 - Had 98% compliance

- OH and Infection Control meet every 2 months a subcommittee looks at PPD and review the policy; they look at any conversions (No occupational conversions)
- TB policy looked at every year
- Respiratory Protection usually audit units had been used, but last few years not used very well
- Plan to have a badge to check how many employees are washing their hands and for how long. It's expensive
 - A detector beeps to let you know that you need to wash your hands

2. Describe how you get your training and education in the RPP

- Initially there is orientation in the training room for every employee that is hired
 - Go over signs seen in contact rooms and the signs are explained – orientation provided by infection control
 - Read signs for isolation
 - Described PPE
 - Discussed and explained what to look for in a room
 - Discussed and explained what is needed to clean with
 - Anyone who does patient care is fit-tested; also any RN in case of disaster and police officers, in case they enter a room with a patient
 - Annual screening takes 10-12 minutes
 - Initially also have a medical evaluation and questionnaire
 - All modules are online for annual testing
 - There are about 15 modules online and all have to be done and signed off annually (electronically)

- Each employee is given two slips of paper at the time of the fit-testing; one of these is given to the manager. The type of mask the employee is fitted for is identified on this slip of paper
- Each manager reviews and verifies that all modules have been completed at the time of the annual review
- Birthday month is evaluation month. If all requirements are not completed, the evaluation cannot be done. Raises are affected by evaluation
- Training/fit-testing includes:
 - Paperwork
 - Donning and doffing means putting respirator on and taking off correctly
 - B/P
 - Seal check done every time the N95 is put on (3 participants “never do seal checks and how to do it was described
 - Seven different exercises and squirting liquid – qualitative testing

3. Care of your respirators

- N95s are to be changed every time the caregiver enters or reenters an isolation room.
Dispose after one use
 - Some of the participants were told to re-use (discussion that that was when not as many N95s were manufactured and hospitals were preparing for the bird flu). Policy states to use clean N95 - one patient, one use
- PAPR is cleaned by tech staff – participants didn’t know what cleaning solution was, thought it was Cavi wipes

- Hoods are thrown away at end of the shift
- Kept on unit—plugged in so that battery works
- Notify Central Supply if it is broken and to request a replacement

4. Recommendations for improvements in the RPP

- Accessibility - There is a barrier to getting a PAPR. Stockroom has a short supply, but one was found on the unit and they returned it to the stockroom
- Storage - N95s are kept in the cabinets, but we seem to need bigger cabinets for respirator storage, so that visitors “stuff” isn’t interfering with the nurses kits in the cabinets
- Education - Would be good to expand to include more things to prompt to check for respiratory isolation protection
- Seal Check emphasized
- Spot checking for respiratory protection knowledge should be done on each floor
- Need stock of respirator ahead of time

5. Knowledge and skills needed for use of respirators?

- Instructed about when to wear respiratory protection
 - Proper donning and doffing
 - Important to know how to take N95 off properly (lesson from SARS – people who got sick in Canada did not get sick from patients, but from taking off their mask incorrectly)
 - Instruct employee that if you have a beard and use an N95 respirator; they are not effective with facial hair
 - Where to locate PAPRs

- Keep on the unit
 - Hoods in stockroom/Pyxis
- Anybody can put a patient in isolation
- Important to know correct placement of N95 straps
- MDs need training
- Visitors must be more knowledgeable about masks and confidentiality– maybe a pamphlet written for visitors only
- Managers know the size and type of respirator each of their employees are fitted for – maybe a card or sticker for their badge would work; 90% people who come to OH do not know the size of respirator they have been fitted with

Hospital C2

Attendees:

Job Title	Department
1. Housekeeping Professional	Environmental Services
2. RN	CIU
3. Respiratory Therapist	PICU - Pediatrics
4. RN	Emergency Department
5. RN (Assistant Nurse Manager)	Nephology
6. RN	Pediatrics
7. PA	MIU
8. MD	OH Services Medical Director
9. Care Partner	OH Services
10. Care Partner	OH Services

1. Describe your respiratory protection program

- The respiratory program works to benefit us by protecting us from patients in isolation
- Droplet precautions are different from airborne precautions (wear surgical mask).

Participant has a beard so has to wear a PAPR in droplet precautions situation

- We have a policy and procedure for Respirator Program online and it is available to anyone 24/7
- We have a whole gamut of protective devices such as:
 - Filtration on high frequency ventilators
 - Every ventilator is filtered to protect us from whatever the patient has
 - Regular masks
 - Hoods
 - In PICU Peds almost every patient is on isolation of some type if have any respiratory symptoms to protect everybody
- RP is patient driven, it depends on how patient present
 - If patient is suspected of having something they need to be on isolation for, they are given a mask when they walk in the door – mask if part of the triage process

- It is policy/procedure driven on suspect or confirmed diagnosis
 - We have 4 negative pressure rooms in the ED, where suspected patients can be placed until diagnosis is confirmed
- Annual fit-testing for N95s and if cannot be fitted for the N95, they have to use a PAPR
- Training is online and can check if have any questions about procedure
- Nephrology has 8 negative pressure rooms
 - We see a lot of patient's with TB diagnosis other patient's requiring negative pressure
- We stick to the RPP policy and procedure
 - PAPRs are kept in the anterooms
 - Hoods are kept in supply cases – easily accessible for everybody
- Education is annual – in OH
- Our program is very compliant
- If we have a question, we either call OH or consult the policy and procedure
 - We have a supply room and we can get more supplies, if we need them
- On Peds we have 4 negative pressure rooms and the entire KISS unit is negative pressure
 - N95s and hoods are available
- There are 2 rooms with a glass door and sometimes people don't understand that both doors need to be closed and the glass door need to be closed – not necessarily the nurses, but other ancillary staff
- 7,000 employees at campus and fit-testing is done on majority of the employees
- We do qualitative fit-testing
 - Previously (in years past) used Portacount for quantitative testing, but couldn't make them work
- We have masks in OH clinic (N95s) in various sizes, so they are available
- Initial fit-testing includes the OSHA medical component (questionnaire)

- MD provided nursing staff with guidance as to what should and should not be referred to physician
- Generally, no access barriers to obtaining N95s
- It is very difficult to get a PAPR – rarely needed on Cardiac floor, but if needed, may take 2-3 hours to obtain
- N95s are stored in Pyxis and RNs have access
- Fit-testing conducted in OH and includes
 - How to wear mask
 - Talk to employee about important to wear and take mask off properly
 - Donning and doffing demonstrated
 - Every employee in patient care fit-tested and educated
 - OH gives each employee a “receipt” describing what they have been fit-tested for-one for employee and one for manager
 - Fit-testing tied to review
- Have 2 types of N95s....regular and the duck bill
 - Duck bills should not be available any longer – should be looked into and removed because not fit-tested for in OH-check to see if this is an N95 and if so, needs to be fit-tested for or eliminated

2. Describe how you get your training and education in the RPP

- Training and education is done by online module and is part of the Learning Center Modules
 - Module talks about TB and Hepatitis, etc
 - Fit-testing done annually in OH
 - When module completed, a certificate printout that states module completed
 - Module completion is verified in yearly evaluation by manager

- Testing and education needs to be completed during employee's birth month annually
- Even families, particularly in pediatrics, have to be educated about isolation and what that means, before they can enter the patient's room
- Family and visitors to pediatric patients tend to be more non-compliant with gowns, than with masks
- Nurses will sometimes put on a surgical mask, if they themselves have an URI to protect the patient
 - Precautionary use of RP is based on symptoms of respiratory symptoms, complaining of coughing blood, etc.
 - In PICU if patient coming from an outside facility with respiratory diagnosis, have cart ready outside the room and use RP as a precaution
 - In Peds, if patient having spinal tap, use droplet precautions so you have to wear a mask and gown
 - Sometime see airborne precautions and sometimes droplet precautions and just follow the protocol
 - Doffing and donning means putting on and taking off
 - Seal checks are not done by everyone
 - Process reviewed about doing a negative check
 - Reminded to do every time you put on the N95

3. Care of your respirators

- N95s are disposable and are for single use
 - Dispose of in trash bag anteroom or out by the door
 - Have two sizes: Regular is white and large is blue
- PAPRs are cleaned with Cavi wipes by whomever wears them
 - Charged in department where being used

- If damaged get replacement from Biomedical
- If have a question about the program we go to OH or the safety department, but should check policy and procedures online first

4. Recommendations for improvements in the RPP

- Have PAPRs readily available
 - PAPRs com from Central Supply
 - Hoods come from stock room
 - Biomedical repairs PAPRs that need repair
 - Need to have at least one on each floor'
 - Need to stay charged – person using it should charge it, but sometimes not done so next person is able to use
 - MIU does not have need to use RP as much as RNs, may not use for 4 or 5 years, so maybe return demonstration when annual training occurs
 - Fit-testing, straps when donning are sometimes not in proper place
 - When doffing, sometimes do not hold mask in palm of hand and thus germs can get on hands
 - Reinforcement helps

5. Knowledge and skills needed for use of respirators?

- Education about why use of respirators is necessary
- Know your resources; i.e., where to go to find the answer (P & P or OH)
- Random spot checks – show me how to do it, etc.
- How to make isolation rooms more effective with ancillary personnel and families
 - Maybe alarm sounds when doors open for a period of time (or alarm to state “Close the door now”

Hospital D1

Attendees:

Job Title	Department
1. Respiratory Therapist/Supervisor	Pediatric Neuro
2. Registered Nurse/ Supply & Equip. Coordinator	Emergency Services, including Observation Units
3. Supervisor	Respiratory Care - Adult
4. Supervisor & Clinical Educator	Surgery & Trauma
5. Registered Nurse/Charge Nurse	Clinical Evaluation (umbrella under ED)
6. Registered Nurse	Infection Prevention
7. Registered Nurse	Occupational Health

1. Describe your respiratory protection program

- The Respiratory Protection Program is through Occupational Health
 - They do all Fit-testing
 - All staff are fit-tested
 - PAPRs are available through Occupational Health
- New employee fit-testing done in July
- Fit-testing is done annually; every unit has a designated month
- A card identifies the mask and size employee fit-tested with and is given to employee
- RPP Policy is on the web (online) and available to all employees 24/7
- On one unit (ED), airborne protection is used, but they have no negative pressure rooms
 - We do have a HEPA ventilator for room if needed – ordered from equipment area
 - Signs are posted that PPE is to be used
 - Carts are outside the room for supplies
- One unit (Surgery & Trauma) keeps a current list of masks and sizes for each employee in a cabinet where all masks are kept
 - Masks are provided by Materials Processing & Distribution (MPD)/Central Supply
 - This unit has 16 negative pressure rooms

- Signs are posted on door of room to identify PPE required
- Questions are answered by Occupational Health
- If an employee fails N95 fit-test, they use positive pressure masks when needed
 - Battery pack is kept on the unit for those who need it
- There are 7 negative pressure rooms in the ER, on the adult side
 - A cabinet holds all size masks
 - Signs are posted on cabinet doors and lists what PPE is needed for protection for various conditions
- During orientation signage and PPE are reviewed for different isolations
- Occupational Health evaluates program by doing periodic inspections (signage, etc.) & sometimes collaborates with Infection Prevention
- PAPR available on each floor-both hood and battery
- No problems with access to supplies except
 - When Respiratory Therapy comes they may not know where on each unit, supplies & PAPR batteries are kept (18 floors & 6 ICU's – they go to all areas).
 - The RT's store their supplies/hoods in their locker
 - PAPR is charged and kept with “everything” on unit in the ER. Fresh hoods are ordered from MPD

2. Describe how you get your training and education in the RPP

- All staff in patient care is included in RPP, except secretaries are fit-tested for RP (unless a SecTech – who works with patients)
 - All in ER including Secretary
 - Each floor has specific month for fit-testing and education
 - Computers have a “yearly learning link”, which is used for competencies every year (same month identified for fit-testing)

- Module for RPP takes 15-20 minutes to complete
 - There is the opportunity to test out
- Occupational Health identifies size and checks to see if still good fit
 - Conduct exercises & questionnaire
 - Fit-testing is qualitative
- Seal check to be done every time mask is put on – they were able to describe
 - Recheck seal if mask loosens or slips
- Problems with visitors
 - Airborne isolation does not allow children in the room
 - They won't wear PPE if have taken care of patient at home and already been "contaminated" at home, especially in ER
- Masks used include different types of N-95s
 - Duckbills
 - Moldex
 - Kimberly Clark Technol
 - PAPRs
- Occasionally see people not donning and doffing properly (straps not correctly placed

3. Care of respirators

- N95s to be changed if get too moist, splattered, or 12 hours with same patient
 - Most departments follow one mask one time (change each time enter patient's room)
 - Have seen personnel wearing mask on elbow to reuse
 - May reuse if mask stays in ante room with name on it
- Dispose in contaminated room
- PAPR can be replaced by calling MPD

- PAPRs wiped down completely with Sani wipes in each department
 - If TB, clean with bleach wipes
 - In Respiratory Therapy, a Technician takes care of cleaning PAPR
 - Pregnant nurses – Charge nurse switches assignment so that they do not have to use a PAPR
 - Pregnant women not allowed in room when certain meds are given
 - Patamadine?
 - Methytrexate – pregnant nurse not allowed in room for 45 minutes after med administered.

4. Recommendations for improvements in the RPP

- Training for each area as to where signage & supplies are kept
- Better access to equipment on each unit since stored in different areas for RTs
- Ante room storage of RP
- PAPR and battery pack hard to find in some units
 - Need easier ordering because it takes a while to get the equipment
- All hospitals go universal on the mask
 - When transporting patients from hospital to hospital - will this mask fit me
 - Different hospitals use different masks and staff work at several hospitals; have to be fit-tested at each one

5. Knowledge and skills needed for use of respirators

- How to put PPE on correctly
 - Donning and doffing
 - Seal checks
 - Is it to be used each and every time or not
 - If discontinued, does everyone know it

- Better understanding/training about transporting patients with TB, etc.
 - Who wears the mask
 - If patient wears the mask how to do it with high flow O₂ or ventilators – is mask put on transporter/staff or patients or both (exposure in elevator or hallway - visitors)
- Masks most commonly used to protect against exposure to TB, MRSA, chickenpox, shingles, and measles
- Be sure they know they are not alone – if unsure about anything check with resources,
Occupational Health & Infection Prevention

Hospital D2

Attendees:

Job Title	Department
1. EMT-P (Critical Care Paramedic)	Critical Care Paramedic Transport (helicopter)
2. RN	Critical Care Transport (helicopter)
3. RN Staff	Clinical Evaluation Areas - Post-Surgery
4. RN Supervisor & Clinical Educator	Clinical Education Med-Surg Intermediate
5. Clinical Services Lab Technician/Phlebotomist	Pathology- Entire Hospital
6. LPN	Occupational Health Services

1. Describe your respiratory protection program

- RPP in Policy Manual on mobile computers (in transport trucks) & in hospital
 - 24/7 access
 - On desktop – PDF files, do not need internet to access the policy manual
- Questions answered by Occupational Health and Supervisor
- Transport personnel have own N95s and keep various sizes on vehicles (trucks & helicopters)
 - If TB suspected, policy is to wipe down back of the patient compartment, take truck out of service for one hour and leave doors open
 - Same as above for aircraft
- Post-surgery has no negative pressure rooms-usually don't get respiratory patients; but personnel may be floated to other areas to work, so annual testing required – 1 time per year
- All employees brought in through system-wide orientation
 - PPE and isolation precautions are part of this orientation
 - Annual competencies that are computer-based
 - Annual “check-offs”; this is the actual application of the mask and/or equipment involved
 - Occupational Health and Infection Prevention support the RPP
 - Unit training done continually - each unit is assigned to be completed each month

- All equipment provided at Unit level
- Materials Processing & Distribution Department makes materials available as needed
- Have equipment check-off - Most units store PAPR hoods
- Have negative pressure isolation rooms which are checked on daily basis
- Infection Prevention monitors patients in room for test result and lets staff know when PPE & respirators are needed/required
- Any employee who comes in contact with a patient is required to be fitted with PPE
 - If clinical secretaries not required to be fitted with PPE
 - If split position of clinical secretary/nurses aids required to be fitted with PPE
- In the lab - Fit-testing done through Occupational Health
 - As part of annual lab qualifications for a continuing education - PPE review done
 - Lab has a mentor committee – they quiz new hires up to 6 months to reinforce knowledge about proper PPE
 - If working in a negative pressure room; PPE is stored near the door; also keep a stock in the lab and can have one “tubed” to employee needing it
- Policies include visitor protection as well as employee and patient protection in all isolation areas
 - Nurses and Infection Protection will educate visitors about why it’s necessary to use PPE
 - Have patient education materials that can be provided to visitors that explains importance of wearing a mask
 - Visitors who are non-compliant can be restricted
- Sometimes signs are missing, but if so and room is entered without protection , have to decontaminate (clean with sani-wipes) equipment (notebooks, cell phone, etc. and get signs replaced
- Chain of Command for questions

- Charge Nurse /Manager/Director/ Team Leader
- Occupational Health
- Infection Prevention
- No barriers to getting N95 or other masks

2. Describe how you get your training and education in the RPP

- All Fit-testing done in Occupational Health
- Mandatory annual education by computer programs that is extensive
 - Isolation precautions and steps that you take
 - Why you do what you do
 - Covers outcomes
 - Incorporated with lots of different modules – about 20 modules
 - Severe consequences if not done-employee is taken out of service for non-compliance
 - Learning Link (computer) tracks reports to managers about who is coming close to end of time requirement for annual education timeline & it is addressed individually
 - Occupational Health also stays “on top” of education and fit-testing requirement; even if someone is out on leave
 - Also, educate staff if significant weight change or other physical changes, need to be re-fit-tested
- Donning and doffing means putting on and taking off
- Able to describe how to do seal checks
- Required to do a seal check every time put the N95 on; also if moving or talking makes mask move

3. Care of respirators

- In the trucks the N95s are stored in a cabinet in the back of the truck
 - Usually stored in a bag

- The Duckbills are either in a zip lock bag or the box they came in originally
- In the aircraft, masks are stored in a zip lock bag in a drawer
- Masks are worn throughout the call
- Throw them away when finished
- In the hospital when leaving the room, must remove ALL PPE and dispose of it in the proper trash can or bags for the room
 - Upon reentry to room, use a fresh mask, gown, etc.
- If PAPR is damaged
 - Replacements are kept in stock
 - PAPR hoods are assigned to one individual and can be used several times
 - If damaged or soiled beyond repair, not to use it again
 - The individual who owns the PAPR hood is responsible for cleaning the unit
 - Not many PAPR hoods in use – easy for hoods and the masks to get soiled, and if you wear them for > 5 minutes, they get damp, so they are just disposed of
 - Clean with bleach wipes (on unit)
 - Most units have isolation towers and docking station for the PAPRs

4. Recommendations for improvements in the RPP

- Visitors are shown how to don masks – educating family members/visitors
 - They have to be signed in and out, depending on the isolation precautions
 - On the tower holding the PPE supply, there is a visual instruction of what to put on first and each step of what to do
 - At this organization the process to assist visitors with RP compliance with the RPP is made simple, because we have tools in place to support it
 - Education
 - Experienced nurses

- Signage that everyone understands (words & pictures)—available in multiple languages (Spanish & French)
 - Interpreters are available to help explain to visitors
 - Make it as user friendly as possible
- When a patient is discharged from certain areas in the hospital (infectious disease & respiratory) to be discharged to another facility. Patient belongings are packed up into a garbage bag and set on the floor in this infected room and are carried out into the hallways. More education about how to handle this situation would be helpful – then transport truck is contaminated, along with halls of the hospital – the helicopter is too small to carry bags of materials

5. Knowledge and skills needed for use of respirators

- Should include the ramifications of choosing not to use mask or not to seal it properly
 - Not only ramifications to yourself, but to others
- How to seal check properly
- Have good education tools and support in place for new RP users

Hospital E

Attendees:

Job Title	Department
1. LAS Coordinator (specimen processes) & interacts w/ Phlebotomy Team/ Fit-tester	Laboratory
2. Supervisor	Radiology & Angio Tech
3. Respiratory Care Coordinator	All areas in hospital
4. Manager	Step Down
5. Education Supervisor	
6. Clinical Educator	
7. Nurse Manager	Infusion Suite
8. OHN	Covers all areas
9. Manager	Intensive Care
10. RN/Fit-tester	Med-Surg

1. Describe your respiratory protection program

- RP policies online - available 24/7
- Policy on different types of isolation and what PPE should be used
- Policy on Fit-testing includes
 - Procedure/process for fit-testing
- Everyone in clinical areas fit-tested in birthday month
 - Fit-testers throughout the hospital who do fit-testing & complete paperwork & give to OH to keep in a computerized system, this includes what size each individual wears
- All clinical personnel get fit-tested
 - Housekeeping and Phlebotomy have fit-testers for their area
 - OH fit-tests case management & security team
- One area (Infusion Suite has fit-tester) has 2 negative pressure rooms with ante room where all PPE supplies are kept
- Use 3M & Duckbill masks

- Questions are referred to educators (for fit-test size) or Occupational Health
 - May suggest hanging old mask in locker, so they can refer to it for size
 - May also call supervisor for the PAPR
 - PAPR kept in Respiratory Dept. & on Step Down Unit (in Anteroom)
- Policy for N95s is one entry, one mask
- Evaluation included implementing some of the items learned in RPP Conference in May that had not been included previously (see items in #2 below)
- N95s are available from Materials Management
 - Stocked in each department in a specific area
 - If storeroom not open, can borrow from nearby unit
 - Supervisor can get them, if stockroom closed
 - In isolation rooms, always stocked in cabinets in anteroom

2. Describe how you get your training and education in the RPP

- Since Respiratory Conference added
 - Stressing the seal check to be done each time you wear the N95
 - Added wearing mask 5 minutes before fit-testing
 - Added 7th step to fit-testing (were doing 6 steps)
- Net Learning modules, including one for RPP
 - Modules are mandatory for every hospital employee
 - If not completed by the day after their birthday month, the employee is suspended from work for 3 days
 - There are 20 modules to complete annually, RP is one of them
 - Respiratory takes about 10 minutes
 - HR also tracks completion of the modules
 - Managers track fit-testing requirement

- Seal checks described by participants
- Donning/doffing means putting on and taking off respirators
- Need refitted with N95 if weight gain or loss, dental issues

3. Care of respirators

- After use, N95s are disposed of in the anteroom
- If PAPR breaks, call clinical engineering – they are stored in anteroom
- PAPRs cleaned with bleach wipes
- Person using the PAPR responsible for cleaning after each use
- Occupational Health restocks disposable shields & head covers & makes sure the battery is charged

4. Recommendations for improvements in the RPP

- Need better tracking system to be sure that the annual testing is being done on time
 - Only 2 PAPRs in-house, they are expensive
 - For those who cannot be fit-tested, If something happens to one of the PAPRs or they run out of supplies on 3rd shift, it's difficult to get supplies
 - Cost of hood & mask
 - Shields: 40 shields cost \$100
1. Encourage people to be fit-tested for N95's
 2. Someone may be fit-tested yearly and then not use mask for 8 months; they forget what they were fit-tested with
 - Recommend a way to remember to quickly identify what mask and size they were fit-tested with

- Discussing use of a label or sticker to put on badge
- OH plans to meet periodically with fit-testers to be sure information provided to employees is consistent (Good slides on 3M website)

5. Knowledge and skills needed for use of respirators

- Need to stress to use mask you have been fitted for
- Proper way to don and doff
- Proper way to do seal check
- Instances when need to wear N95 – may know about TB, but may not know about chickenpox, shingles, etc.
- ED education to identify if need for airborne/droplet needs to be implemented to ensure safety
 - Symptom awareness for potential diagnoses
- No kids in room with airborne precautions

A side conversation:

- Visitors wear surgical masks - not fitted
 - Conversation about surgical mask not protecting visitor, but gives impression that they will be protected
 - Visitors are to check with nurse before entering room
 - Cannot tell visitor if someone has TB, and surgical mask would not protect
 - Should hospital have policy that no visitors (to protect visitors) allowed for patient in isolation for something like TB
 - Does providing surgical masks for isolation visitors set hospital up for being sued

Hospital F1

Attendees:

Job Title	Department
1. Safety Officer in the hospital (IH)	Environmental Health & Safety
2. Case Manager (Social Worker)/Fit-tester	Inpatient Infectious Disease Service/ Patients w/ Respiratory Chronic Disease
3. Operations Specialist/Fit-tester (Social Worker)	Clinical Care Management - Responsible for storage, tracking, etc. of respirators

1. Describe your respiratory protection program

- A written RPP is online. All employees have access 24/7
 - Pat Boone (EH&S) is responsible for the program
 - For a major chemical spill (only time EH&S would use respirators), use full-face chemical respirator – trained and fit-tested by Pat
- If working with a patient with an infectious disease, use RP until TB, etc. is ruled out
 - For airborne precautions, signs would be on door of patient, indicating what type of RPP to use
 - Respirators are available on a cart outside patient's door
 - Surgical masks are used for visitors because they are not fit-tested
 - There is an online annual training program, which includes proper use of respirators, reeducating users to pay attention to signage, etc.
 - Online testing required online before fit-testing – if not completed, not able to be fit-tested. When online testing completed a certificate is printed for the tester
 - Employees are fit-tested annually with a new respirator provided
 - Fit-testers are trained by Pat Boone and protocols and procedures for testing are followed by the fit-testers
 - Data/records of training are saved

- All RPP questions go to Pat Boone
 - There are 4 options for respirators and if a fit-tester is unable to fit an employee, he/she is sent to Pat for fitting with a different respirator.
 - All fit-testing is tracked in a database and paper is kept
 - More information requests may be found on Intranet or can check with Pat Boone
 - A binder with step-by-step directions in fit-testing and training of donning and doffing
 - The fit-testers make sure there are enough respirators on hand
 - Keep respirator stored in a ziplock bag in desk if going to reuse
 - Stress how to donn/doff and maintain to protect respirator
- All employees are medically cleared and fit-tested at time of orientation
 - The training modules, the Learning Management System, include modules on infectious disease, respiratory protection, TB, and Prevention and are required to be completed annually
 - Respirators used include
 - 2 N95s (Regular and Small)
 - Duckbill mask
 - One other
 - Three are from the same manufacturer and one from a different manufacturer
 - PAPR option is for those who the fit-testers are unable to fit-test
 - Pat Boone takes charge of the PAPRs and issues them as needed
 - Some departments have their own
- Nurses can put patient on Respiratory Protection precautions before a diagnosis is made
- There are no respirator access barriers; respirators are stored on the units and are easily accessible; there are good supplies in the departments

- Respiratory Program evaluated in general - unknown, but if there is an employee exposure the employee is notified by the Epi Department and everything is tracked (nosocomial infections, hospital acquired infections, hand washing, etc.)

2. Describe how you get your training and education in the RPP

- Questionnaires - medical clearance
- Annual evaluation - prep system (online training) is required to be completed prior to evaluation
 - The module covers donning/doffing
 - When to wear the respirator (disease entities)
 - Why you need to wear the respirator (Education about TB, etc.)
 - How long respirator will last
 - Signs you should look for to know if you need to dispose of the respirator
 - Signs of infection
 - Diseases respirators are used for
 - Prevalence and statistics of TB, etc. and how you may be exposed
 - How you are exposed
 - Questions that require answers pop-up as you review the module
 - Includes a profile picture of how to wear the respirators correctly (to demonstrate strap placement)
 - Seal check is part of training and to be performed each time respirator is put on and if it moves while being worn and providing patient care
- Management observes proper wearing of respirators by employees on floors
- N95s are to be replaced if bent or not to be kept more than 7 days, whether damaged or not
 - The 7 day use has been taken out of the policy, but still is in the training modules - Pat is working on that to see documentation about correctness of this
- Respirators are to be discarded in the trash in the patient's room

3. Care of respirators

- PAPRs are cleaned with sani-wipes
- N95s and others are replaced if bent or in less than 7 days whether damaged or not
- Pat cleans and is responsible for PAPRs he has and the departments which have PAPRs on the floor take care of them

4. Recommendations for improvements in the RPP

- One thing they do, which they feel is good is that the fit-testers have an annual review with Pat
 - Policy and procedure is reviewed and demonstrated, so that consistency will be maintained
- One recommendation is to develop a mechanism for review for employees or fit-tester, who do not use a respirator regularly and feel that they may need a review
- A shortcoming that needs attention, especially for the OR, is that the 3M PAPR directions state that it is not intended for sterile environments and not tested when wearing surgical mask under the PAPR

5. Knowledge and skills needed for use of respirators

- How critical it is for their health to protect themselves from diseases
- Those who go behind to clean-up need to be aware of what can happen if they don't wear a respirator
- All employees, even off-site, may never come in contact with a patient, but they need to be educated in case they need to use a respirator or have to come to the hospital in critical times (SARS) outbreak concerns
- Discuss and demonstrate proper donning/doffing/seal check procedures with return demonstration

Remind of the importance of their health

Hospital F2

Attendees:

Job Title	Department
1. Registered Respiratory Therapist	Sanford Outpatient Clinic
2. Industrial Hygienist in the hospital	Environmental Health & Safety
3. Social Worker Case Manager/Fit-tester	Lung Transplant Patients
4. Clinical Support Technician (Nurse Assistant/Unit Secretary—currently in nursing school)/Fit-tester	Emergency Services

1. Describe your respiratory protection program

- Annual fit-testing is required, but first must complete the online training module
- Qualitative testing done with saccharin
- They are changing to Quantitative fit-testing for full face respirator (for chemicals) wearers
- Pat Boone manages the RPP
 - Pat does train the trainer fit-testing
 - Pat confirms that the paperwork/records/equipment are in order
 - Pat holds annual refresher training for the fit-testers to evaluate problems
 - Procedures are outlined for fit-testing
 - He is the go-to person for questions - “he is very responsive and good about following-up”
- There are several thousand people in the RPP
- 25+ people fit-tested after doing module online training by one member of the focus group
- Each year there is a “Skills Fair”, which includes respiratory protection
 - Some nurses wearing small N95s failed the testing, so were changed to the 1870 model (duckbill mask)
- Everyone who has direct patient contact is fit-tested
 - Use N95 small and regular and 1870 duckbill masks

- There is a 15 minute wait after someone has coffee or chews gum before they can be fit-tested
- The written policy is in the EHS policy manual and is online, so it is available to everyone
- There are no RPP access barriers; plenty are ordered and on the floor and available
- If a patient is admitted and is suspect, RP precautions are implemented
 - Admitting or the ED tells the nurse if a patient should be on respiratory protection if it has been overlooked or patient has symptoms of coughing
- Program evaluation is done through rechecking RP fit and checking exposure statistics and refresher training for fit-testers

2. Describe how you get your training and education in the RPP

- New hires are tested on orientation
 - Must complete an initial medical questionnaire
 - Fit-testing done during orientation
 - Annual testing
- Each department is assigned a month to be fit-tested
 - 10 - 15 minute module on RPP required to be completed prior to fit-testing or fit-testing will not be done
 - Fit-testing takes about 30 minutes/each to do each step; but if tastes the saccharine, need to start all over again and will take a lot longer
 - Evaluation cannot be done without the annual training module and fit-testing being completed
 - Train the trainers/fit-testers have a separate module to review
 - Employee module discusses
 - Droplet and airborne precautions
 - What diseases require RP

- Donning/doffing procedures
- Seal check procedure
- 12 hour shifts may use Ziploc bag to store the mask & not to crush the mask
- If nurse is with the patient for entire shift, at the end of the shift change mask
- Use the mask for a week if not used much
- If mask is soiled, worn, or torn must be discarded
- Hospital has many negative pressure rooms
- Carts are outside isolation rooms and extra masks are stored in the isolation cart
- Signs are on patient's door identifying precautions needed to enter the room
- Surgical masks are used for visitors
- Donning/doffing/seal checks with return demonstration
- Facial hair - must shave before fit-testing. No PAPR typically used

3. Care of respirators

- 12 hour shifts may use Ziploc bag to store the mask & warned not to crush the mask
- Also warned not to hang the mask from the straps because they will stretch out and then mask won't fit correctly
- If nurse is with the patient for the entire shift, at the end of shift, change mask
- Use mask for a week, if not used much and not damaged, visibly soiled, or straps torn
- Dispose of mask in trash in the patient's room

4. Recommendations for improvements in the RPP

- Strengths
 - The RPP keeps employees protected
- Weaknesses
 - Some fit-testers want to leave out a few steps in fit-testing

- Many people won't need RP, but since the patients are not diagnosed immediately, they are put on RP to prevent exposure. This is also a strength to protect employees
- Improvements
 - Elderly employees have difficulty if they are RP users and have respiratory issues; they mention feelings of "suffocating" when wearing RP
 - Medical questionnaire/spirometry may be indicated
 - Make it really clear as to why "they" need to use RP properly, using statistics on how many employees have gotten sick from patient
 - ES has had it happen and sent employees who were exposed to occupational health
 - If patient is coughing, have them put on a surgical mask and the employee should use the N95 or whichever respirator they were fitted for

5. Knowledge and skills needed for use of respirators

- Knowledge of what diseases are contracted by employees from respiratory exposures (using statistics)
 - Danger of exposure
- Donning/doffing/seal checks demonstrated and return demonstration
- For what diseases RP should be worn
- Protect yourself in ED
- Proper storage and maintenance of respirators
- When and how to change respirators
- Entire process of RPP needs to be included
- Importance of fit-testing needing the amount of time and testing it takes -and importance of not taking shortcuts

- Explanation of what is required in fit-testing so the employee won't be frightened or get claustrophobic

Summary of Each Focus Group Question

1. Can you describe your respiratory protection program?

All hospitals participating in the focus groups had a written respiratory protection program (RPP) policy on line (intranet) and available to employees 24/7. The policy is even available on mobile computers as PDF files in transport trucks and aircraft so internet access is not needed. In addition, any RN without patient exposure is included in the program because he/she may be called to work with patients in case of disaster. Police officers entering a room with a patient are also included.

The respiratory program in each hospital includes initial education with medical questionnaire and fit-testing as well as an annual centralized computer-based training and hands on fit-testing. None of the hospitals had access barriers to obtaining N95s; typically there were “plenty” at the isolation rooms with all sizes available and if not, they could easily be obtained by checking with the closest department or pod or calling central supply materials handling and getting them “very quickly”. One hospital mentioned that during annual fit-testing there might be a delay getting “masks” and the reason for this was unclear other than supply issues. Fit-testers need to call ahead to have more respirators available for annual fit-testing. One hospital mentioned that there were some barriers to getting PAPRs when needed due to having too few numbers of them; however, they were able to “find” one eventually. In the comments about access barriers, one hospital mentioned that audits are conducted frequently to see if the N95s are accessible and auditors found that the definition of accessible is viewed differently. To the nurses, accessible means in the Pyxis unit and to Infection Control, accessible means respirators are “right there” in an unlocked cabinet by the door to the patient’s room. Clarification and standardization about accessibility would be useful.

Fit testing methods were described as variable among the hospitals with some hospitals doing qualitative and some doing quantitative testing. The reason behind this seemed to be about how many could be done quickly. Also it depended on who was doing the fit-testing i.e.,

environmental services or employee health. For example, one hospital does quantitative testing for the initial test because all initial testing is done in environmental services. One hospital is changing to quantitative for full face respirator wearers and all other testing is qualitative but the three other hospitals use qualitative fit testing.

As with fit-testing, evaluation of RPP is done in several different ways but not everything is included in evaluation. It was also unclear if the focus group participants knew what evaluation should be included. For example, some hospitals review their communicable disease statistics as a measure of evaluation such as tuberculin skin testing conversion or a rise in the rates of communicable diseases. Other examples included [periodic](#) inspections to check for signage, etc. If an employee exposure occurs, the department notifies the employee and everything is tracked (nosocomial infections, hospital acquired infections, hand washing, etc.), and checking exposure statistics and refresher training for fit-testers.

Generally, questions about the RPP are directed to either the employee health nurses, infection control nurses (particularly if question about a patient needing to be isolated before diagnosis confirmed; i.e. TB, shingles), or the individual who is in charge of the RPP. Individuals can also check with their supervisor/manager/charge person, or the policy manual.

The strength of the RPP is that exposure to employees is reduced and they are protected. One participant said that the laboratory in the hospital has a mentor committee; they quiz new hires up to six months to reinforce knowledge about proper PPE. Two other hospitals stated that the RPP gets better every year and that the training is good.

One hospital offers flu shots to all families and asks if patient wants a flu shot on admission. The hospital also offers pneumonia vaccinations for people of certain ages upon discharge.

Weaknesses identified included difficulty to get third shift people tested; if an employee is out on FMLA or due to an injury, it is necessary to keep a close watch so that they don't "fall through the

cracks”; some fit-testers want to leave out a few steps in fit-testing and it is important for all fit-testers to be consistent in their instructions and fit-testing.

2. Can you describe how you get your training and education in the RPP?

All hospitals participating in the focus groups use respiratory protection computer-based training modules (intranet) which are available to employees 24/7. All hospitals require initial education and fit-testing followed by annual training and fit-testing. At one hospital system, if an employee does not have a personal computer (housekeeping), computers are available in human resources, at kiosks, and/or nursing units where staff can access and complete the online training programs. This seems problematic and very inconvenient. Also why is housekeeping treated differently? Admission staff are fitted with N95s and trained to use PAPRs.

Anyone with exposure to patients is required to be in the RPP at all hospitals. Not all department administrative staff are included; however, there is a hybrid job title, which is a combination of secretary and nurse aid and they are included. In the emergency departments all staff are generally included in the RPP.

All six-hospital systems described that when hired, on initial fit-testing a medical evaluation is completed and if there are any positive responses, there is a protocol to follow. Several of the hospitals identify a specific month for the annual education and fit-testing to be completed for each department; one hospital uses the employee’s birthday month for completion. At one hospital all initial and annual fit-testing and education is done on all employees by employee health services. Topics included in the initial training are bloodborne pathogen exposure, isolation precautions, and what to do in the event of exposure. The new hires are instructed to report changes in facial structure that might affect respirator fit such as weight gain or loss, dental issues, or growth of beard. Signs are posted and explained, PPE is described and discussed and EHS explains what to look for in a room for cleaning.

Infection control personnel will often give a class at the initial education on RPP and discuss all types of isolation and what to do if airborne isolation room has no N95s in the size needed. If not fit-

tested employee must wear a PAPR. Sometimes employees are provided with handouts on initial and annual fit-testing that illustrates and describes donning and doffing. Workers also described about the “excellent” education they received in employee health about RPP, including the policy itself and information about respiratory protection. They were fit-tested, shown the “helmet”, discussed the policy, and how to use the respirators. This initial training was conducted even before orientation and work in the hospital. Other hospitals stated that included in their online training was information about droplet and airborne precautions and steps to be taken to prevent exposure , donning and doffing, seal check procedures, and what you must do if the seal is broken such as when moving around, how long a respirator will last and signs to look for to know if the respirator needs to be replaced, signs of infection, diseases, how you are exposed, and a posttest must be passed followed by credit being automatically recorded.

In all hospitals employee health does all initial education and administers the medical questionnaires. Department fit-testers (DFTs) are also used and do annual fit-testing in four of the hospitals and employee health continues to do annual fit-testing in two of the hospitals. At five of the hospitals, PAPR training is conducted in employee health; in the sixth hospital PAPR training is done in environmental health. Training activities include taking apart, cleaning, and putting the PAPR back together. At one hospital the train the trainer approach is used. The fit-testers in this hospital are all trained by an industrial hygienist who then meets with DFTs annually and reviews the procedure and information to ensure consistency. One hospital generalized that all facility workers wear PAPRs and housekeepers wear N95s; not sure this was correct.

Participants described the annual computer-based training as taking approximately 15-30 minutes. The posttest must be passed before a certificate is generated. The actual fit-testing takes approximately 30 – 35 minutes to complete. Ramifications for not completing annual fit-testing and training modules on time varies and includes work suspension, manager will not review evaluation with employee until completed, lack of salary raises.

3. How do you take care of your respirators?

Discussion included how disposable respirators/N95's and Duckbills' are handled. One hospital participant said that the disposable respirators are a one-time use for each time the patient's room is entered; some participants in the same focus group stated they reused the N95 but other participants stated that is not the policy. One hospital in this system was told to replace the N95 only when soiled or wet. Following some discussion, participants were told by employee health that replacement of N95s is "under study". Disposal methods are considerably varied. One hospital reported workers use one N95 per patient per day; but the policy states that when not in a pandemic situation the N 95 should be disposed of every time it is used. Two hospitals stated that workers change the N95 every time a caregiver enters or reenters an isolation room/one "mask "one time. Another hospital stated that the N95 should be changed if it gets too moist or it is "splattered". Otherwise it can be used for 12 hours, if with same patient. Still another hospital stated that the N95 should be replaced if bent and after seven days if it is not used much, whether damaged or not. Replacements of the N95s is also "under study" at this hospital. If respirators are disposed of after one use, they are dispose of in the trash container (either can or trash bag in the patient's room or anteroom) – the bag is tied-up at end of each shift.

Discussion about what happens to the respirator when it is taken it off and not disposed of included: store it in a Ziploc bag and be careful not to crush it; store it on a shelf (with name on it) or in cabinet in the ante room (this was mentioned by each hospital where the respirator may be reused). In addition, on transport trucks (one hospital) respirators are stored in a Ziploc bag in a drawer. It was also cautioned to not carry N95s by the strap on the elbow – the strap can stretch and the respirator will not fit properly; the respirator could come in contact with germs as it swings on the person's arm. This was mentioned by participants from two-three of the hospitals.

For cleaning of respirators PAPRs and 3M6000 (half-face respirators) are cleaned either by the person who has used the respirator, technical staff, employee health on environmental services. Use of disinfectants by using Super Sani-wipes (with purple lid), Cavi, or bleach wipes was mentioned by all six

hospitals. One hospital was more specific about the cleaning process which included cleaning the outside hood, the inside bouffant hat, felt strips changed, and plug in battery at end of shift – if PAPR kept on unit. At another hospital it was stated that most units have isolation towers and docking stations for the PAPRs. At this hospital, the individual using the PAPR is responsible for cleaning it.

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Other storage/maintenance points included respirators may be stored in lockers, cabinets or shelves in ante rooms, or in storeroom with owner's name, in plastic bags, and plastic tote container. If there is a problem with the PAPR, the problem should be identified on the check list provided with the PAPR and returned to Central Distribution/Medical Equipment Department.

4. Do you have recommendations for improvements in your respiratory protection program?

Five of the six hospitals, mentioned the importance of ensuring consistency of the fit-testing and training. One hospital suggested identifying junior fit testers to assist in the process. An important finding was that at some hospitals fit-testers for new employees are exposed to saccharine and bitrex and these substances seem to affect the staff creating an allergic-type response for who are exposed over time. All six hospitals discussed the need to either review the policy again in six to nine months after hire, because so many policies are taught initially when hired it may be confusing and also the personnel who use RP infrequently may forget what they have been taught. Suggestions included having

Unit-based competency fairs to refresh knowledge and developing a mechanism for review for employees or fit-testers, who do not use a respirator regularly and feel they may need a review. One hospital is currently working with IT on system and facility compliance in order to obtain campus-wide information from data already in the database from the manager's eTool. Other hospitals mentioned that sometimes an "older" employee might have difficulty if they are a RP user and have respiratory issues; they mention "feelings of suffocating" when wearing RP. The respiratory protection coordinator needs to be alert to this. It was also suggested that all hospitals go universal on the respirator especially when transporting patients from hospital to hospital – as the respirator may not fit and different hospitals use different respirators and staff working at several hospitals could be at –risk; or if workers work at different healthcare facilities then that person would need to be refitted. Three hospitals said there is a barrier to getting a PAPR and central supply has a short supply; need to have at least one PAPR on each floor. Whoever uses the PAPR should remember to charge it, but sometimes this is not done.

Other issues stated included:

- Currently the 3M6000 is shared; everyone should have his/her own.
- Infection Control should post slides to intranet site
- Spot checking for respiratory protection knowledge should be done on each floor - (Practice Champions are very good and helpful this)
- Need to emphasize seal checks
- If isolation/PPE is discontinued, let everyone know
- Language may be a barrier
- Move away from qualitative testing and to quantitative testing
- Sometimes there may not be a sign in the room indicating PPE is needed; need to be more vigilant and proactive.

- A better understanding/training about transporting patients with TB, etc. with regard to if the patient wears a mask, how to manage that with high flow O₂ or ventilators—is respirator put on transporter, staff, or both (concern about exposure to visitors in elevator or hallway)?

There was considerable concern about visitors needing to be educated and respiratory protection enforced with visitors. Education needs to be provided and signage that everyone understands (words and pictures) available in multiple languages – Spanish and French. Interpreters may need to be available to help explain to visitors and explanations must be user friendly.

One hospital mentioned that in the emergency department the deficiencies are early identification and early initiation of respiratory protection. This may be because of the rush experience and heavy workload. Respiratory therapists assigned to the emergency department and are a huge help. They are best to initiate the precautions – and better than nurses who are busy taking care of patients and trauma incidents.

One suggestion for best triage practices included:

- If someone comes in with a sore throat and there is suspicion of streptococcal infection, the nurse can do a rapid strep test and send to laboratory for analysis
- A prompt then comes up because of the test ordered and asks if the person should be placed in respiratory isolation because of the order. It would be good to expand this prompt system to include more to prompt to check for respiratory isolation protection
- It would be good to include education that it is one of the nurse's responsibilities to enter a protocol order for isolation if it is necessary or potentially needed, until it can be reviewed
- When a patient is discharged from certain areas in the hospital (infectious disease and respiratory) to be discharged to another facility, patient disposals should be packed up into a garbage bag and set on the floor in this infected room and then are carried out into the hallways to avoid further contamination of other locations. Also patient belongings should be packaged

up in a similar way to avoid further contamination. More education about how to handle this situation would be helpful.

Participants stated that a better tracking system is needed to be sure that the annual testing is being done on time and that when retesting or reeducation is need, this should be identified. Use of a label or sticker to put on worker badges should be used because people forget what they were fit tested and when retesting is needed.

One hospital mentioned a shortcoming needing attention, especially for the operating rooms; the 3M PAPR directions state that it is not intended for sterile environments and not tested when wearing surgical mask under the PAPR

5. What knowledge and skills do you think are important for workers to have who need to use respirators? In other words, what should healthcare workers need to know to properly use respiratory protection?

Hospitals participants were specific about the importance of information about the health impacts from exposure to infectious agents like acid-fast bacterium is dangerous; not knowing about post-exposure meningitis; chickenpox and shingles. If you do not use respiratory protection properly, you are putting yourself and others at risk. So, more attention is needed to staff being more aware that respiratory protection can save lives. Of course, it was stated and agreed that workers need to

- wear a respirator when require
- know that fit testing is done for a specific model and size. Respirators are not interchangeable
- know that persons with beards who use N95s are not being protected
- know basic knowledge of donning and doffing properly; straps to be placed properly
- do seal check every time the respirator is donned; also when moving about, when laughing, smiling, talking a lot or any other reason that seal may be broken
- hygiene in hand washing, covering coughs etc. is very important
- know isolation procedures and exercise judgment about when this should occur

- know what resources are available to them and use them

All steps of the fit-test process should be explained so employees do not get frightened or become claustrophobic.

It is each employee's personal responsibility to use RP properly. The respirator is your tool. Use it and don't cut corners! It is particularly important in the emergency department when no diagnosis is available early on.

The focus groups occasionally generated other conversation about respiratory protection. Some interesting points included:

- At one hospital, the personnel who attended the IRPP Conference May 30, 2013 met and already made decisions to modify some specific work practices to improve their program and this will be continued
- At another hospital the personnel mentioned that since the IRPP Conference the following procedures have been added:
 - Stressed the seal check to be done each time an N95 is worn
 - Added wearing the mask five minutes before fit-tested to fit-testing procedure
 - Added seventh step to fit-testing (previously the process included 6 steps)
 - Occupational health plans to meet periodically with fit-testers to be sure information provided to employees is consistent
- Fit-testers need to teach "it" right every time and be consistent with what is being taught by each fit-tester
- Visitors must be more knowledgeable about masks, respirators, and confidentiality, and why healthcare workers wear respirators.

Visitors wear surgical masks, which are not fitted. A couple of the participants felt that the “mask” gives the visitors the impression that they are protected and because hospital personnel may not give patient’s diagnosis to visitors because of confidentiality, the visitor may be exposed. Participants questioned whether or not the hospital should have a policy that no visitors are allowed for a patient in isolation for example, tuberculosis in order to protect the visitor. This would be problematic for the patient. Does providing surgical masks for isolation visitors set the hospital up for being sued?

- Some participants stated that the recommendation would be made to the RPP coordinator to continue the Practice Champion Program because it reinforced the importance of “following the policy and procedure related to proper utilization of respiratory protection”
- After hearing some recommendations for work to be done on a few items from Infection Control at one hospital, the OHN requested a list so that OHS could make the changes happen.
- Physicians need training

The participants included registered nurses, medical doctors, licensed practical nurses, EMT-P, industrial hygienists, respiratory therapists, respiratory care coordinators, laboratory technicians/phlebotomists, safety officers, case managers, social workers, administrative assistants, health care technicians (combination unit secretary and nursing assistant), education directors, infection control practitioners, public health epidemiologist, housekeeping professionals, maintenance workers, and physician assistant.

Hospital departments represented included corporate health and safety division, occupational health and safety, cardio-pulmonary, infection prevention/control, emergency

room, emergency services including observation units, family medicine, occupational medicine, infection prevention and rehabilitation, laboratory services, employee health, training and development, telemetry cardiac/med-surg, pediatrics, pediatric neurology, pediatric to adult respiratory care, cardiac intermediate unit, environmental services, internal medicine/kidney floor, KISS (Kids Immuno-Suppressed Specialty) oncology unit-renal, medical intensive care, cardiac intensive care, pediatric intensive care, nephrology, surgery and trauma, critical paramedic transport (both helicopter and ambulance), pathology, post-op surgery, radiology and angiography, step down unit, infusion suite, environmental health and safety, inpatient infectious disease service/respiratory chronic disease, outpatient clinic, and lung transplant services.

Discussion

In a sample of participating NC hospitals this project sought to

- develop, implement, and evaluate an education intervention to improve knowledge for practice about respiratory protection
- describe strategies for effective integration of respiratory protection into practice
- evaluate effectiveness of educational intervention and practice integration.

Participants rated the conference very high with pretest/posttest results indicating good achievement of knowledge learned with a high percentage (68%) of participants increasing (or sustaining their knowledge base of 100 percent) about respiratory protection. In addition, many participants were eager to learn more and improve practice about respiratory protection by becoming Practice Champions in their healthcare systems.

The overall theme of the findings from the Practice Champions' activities revolved around the actual proper use of the N-95 respirator. The employees wearing respirators

needed improved or additional education on the actual use of the N-95. All aspects of donning and doffing properly were a major deficiency seen during the observations. This included strap placement, nosepiece adjustment, and seal checks. Seal checks before exposure from entering the patient's room was another part of the respiratory protection procedures that was neglected. A few workers had the wrong size N-95. Some workers did not understand the difference between masks and respirators and wore surgical masks instead of N-95s. Several workers with facial hair were found using N-95s instead of PAPRs. In addition, several respiratory protection users had not been fit-tested initially or were out of date for annual fit-testing requirements. Administrative guidance could provide enhanced usage of and compliance with the respirator.

This project raised the opportunity for the Practice Champions to reeducate and raise awareness of many users of respiratory protection as to what was being done correctly and incorrectly, why it was important to have annual fit-testing and education, and to monitor each other to ensure protection from contaminant exposure through the proper use of respiratory protection devices. Many Practice Champions expanded their educational activities from the individual worker who was observed to entire departments/units and medical practice staff and personnel. Referrals were made on an as needed basis after the individual was reeducated on the use of respiratory protection and the review of policies and procedures. This enabled healthcare workers to improve work practice, have a better sense of what the policies were and how they affected healthcare worker health, and enabled those workers needing to be refit for the respirator to do so.

Several of the Practice Champions shared that there were changes made to their respiratory program from their participation in this project. Some included the method of

providing education during fit-testing, reminding the staff that the annual fit-testing and education was due, and remembering the type and size of respirator approved to wear which included a sticker on the back of their name badge. All Practice Champions felt this project and the activities were an excellent exercise in raising awareness and providing input to instituting organizational changes to their hospitals' policies and procedures.

From the focus groups, several common themes emerged:

1. All hospitals participating in the focus groups had a written Respiratory Protection Program (RPP) policy on line (intranet) and available to employees 24/7. All personnel with exposure to patients were included in the program including the administrative and registration staff in the emergency room, housekeepers, and maintenance personnel. One hospital mentioned that even an RN without patient exposure is included in its program, because he/she may be called to work with patients in case of a disaster.
2. Fit-testing methods and program evaluation seem to vary considerably across hospitals. For the latter, it was unclear if this was a function of actual lack of evaluation or lack of knowledge on the part of the participant about what the evaluation program should be. Compliance with fit-testing was inconsistent.
3. Care and maintenance of the respirator was inconsistent within the institutions especially knowing what to do about reuse of respirators.
4. None of the hospitals had access barriers to obtaining N95s; typically there were "plenty" of respirators in the ante rooms to the isolation rooms with all sizes available. However, if respirators were not readily available, they were easily obtainable from the closest department, pod, or by calling central supply and would be delivered quickly. Only one

hospital mentioned that there were some barriers to getting PAPRs when needed due to having few numbers of them; however, one could always be found.

5. Storage of the respirators was very inconsistent (e.g., lockers, cabinets, plastic bags in pockets).
6. Much better training is needed in all aspects of the respiratory protection program especially about requirements of the standard, transmission of agents, donning/doffing, seal checks, and transport of patients. In addition, what the health impacts are from exposure to infectious agents, why workers need to be fit-tested, why sizing is important, and that it is everyone's personal responsibility to use RP properly.
7. Regular spot checks should be done in every location to observe usage of respirators.
8. Most hospital participants mentioned that questions about the program or respirators themselves were most frequently directed to the employee health nurse. If the question related to a patient needing to be isolated before diagnosis was confirmed, such as tuberculosis, most frequently it would be asked of the infection control nurse. It was also mentioned that the questions might also be responded to by an industrial hygienist who was also in charge of the RPP, or their supervisory manager, charge person, or by referring to the policy manual.
9. The respiratory protection program in each hospital included initial education with completion of the medical questionnaire and fit-testing as well as an annual centralized computer-based training program and hands on fit-testing.
10. Visitors need to be educated about respiratory protection.
11. There needs to be a better system for tracking for fit-testing and education.

12. All six hospital systems described that when a worker is hired who will need respiratory protection, on initial fit-testing a medical evaluation is done, reviewed, and if there are any positive responses, a protocol is available to follow.
13. Most of the hospitals identified a specific month for the annual education and fit-testing to be completed for each department.
14. Physicians need training.

Recommendations

From a review of information obtained by Practice Champions and through the invaluable contributions of the focus groups, several points must be emphasized for recommendations.

Respiratory protection policy review is minimal and there seems to be a general lack of knowledge of what the institution's policy is by the end-user. Every user should have clear, ready, and immediate access to the respiratory protection policy. Accessibility should be for all workers (e.g., housekeeping, administrative staff). Policy review should be conducted on each unit semi-annually on all shifts, whenever there is change in policy, and whenever there is evidence of consistent policy non-compliance. Policy review should involve not just unit management oversight but the end-user and employee health participation.

Consistency in how fit-testing and education is achieved is important. It was clear that these elements were varied both internally within one hospital system and then across hospital systems. This included procedures for and frequency of fit-testing. Every hospital system should have well defined procedures for performing fit-tests consistent with hospital policy and this should be known to the user. In addition, the fit-tester needs to be well-trained and provide full and complete explanations about the fit-testing procedure and outcomes. Consideration should

be given to having departmental fit-testers with oversight by employee health for annual education and review of consistent performance.

Consistent education should be a priority. Information on respiratory protection should be taught with end-user participation and should include all elements of the OSHA standard as well as any specific key points relative to the organizational system itself. It is clear that general knowledge about transmissibility and health effects of exposure should be discussed. However, emphasis should be placed not only on wearing the respirator but the meaning of respirator reuse and if and when this can be done, the difference between mask and respirator, and disposal, storage, maintenance mechanisms. Online education should also be available and accessible to all respiratory protection program users or those with exposure. This means adequate and effective training must be provided to all workers with clear, ready, and immediate access to any needed information. For health care facilities, consideration should be given to having Practice Champions who can provide guidance and programmatic assistance as well help to increase levels of compliance with and understanding about respiratory protection. Practice Champions were viewed very favorably in this project.

Evaluation of the respiratory protection program is critical and essential. Data obtained indicated this was serious issue. A plan should be developed with scheduled components about how and when evaluation occurs. Both workers and management must have input into the organization's evaluation plan that is consistent with the OSHA standard and the institution's policy. End-users must have a better understanding of the evaluation component of the RPP, how it is implemented, and how performance measurement is tracked. A checklist should be used to determine status and programmatic compliance.

Protection and promotion worker health must be viewed not only in the aggregate but also individually. Workers cannot be allowed to “fall through the cracks” for fit-testing and education; so effective tracking systems must not only be in place but must be monitored. There will be cases where healthcare workers work in different institutions...must they really be fit-tested twice or three times? Respiratory protection procedures must be adhered to during patient transport so the worker is protected. Older workers may need special consideration in using respiratory protection so their breathing is not compromised. Employee health fit-testers need to be evaluated and monitored for allergic development to bitrex and saccharine.

Visitor and patients need to have a good understanding of respiratory protection and how this affects them and the healthcare worker. What should visitors do when visiting family or friends with a respiratory infection? What does it mean to wear a respirator for the healthcare worker? How should patients' belongings be treated?

Responsibility belongs to everyone. This means management must make clear what the policy is and how it will be implemented and managed, and workers need to provide input into and comply with the respiratory protection program. The health care facility is responsible to ensure that all exposed workers are protected, and the employee is also responsible to comply with hospital policy, procedures, and protections. Clearly, much more education and consistency in practice is needed that needs to be emphasized from the administration and healthcare workers.

Competencies for Respiratory Protection

Any worker who has the potential for exposure to influenza should be protected and should have specific competencies to be able to achieve a standard level of protection. From

the focus groups data collected and logged observations, several competencies were derived that cut across all workers who need respiratory protection. Workers should be able to:

1. Recognize when respiratory protection is needed.
2. Know the current hospital respiratory protection policy and schedule for implementation of fit-testing and education.
3. Describe what aerosol and droplet transmission means and what health impact from exposure to infectious agents might occur to self and others if respiratory protection is not used properly.
4. Know what to do if a respiratory exposure occurs and whom to contact.
5. Describe when a respirator should be used, and consequences of not wearing the specific fit-tested model and size.
6. Demonstrate donning, doffing, and seal check of respirators using proper strap placement.
7. Know methods of care, storage, maintenance and disposal procedures for respirators of all types and practice good respiratory hygiene.
8. Be accountable for respiratory health protection as a result of work-related exposure.
9. Identify internal and external resources for obtaining information on respiratory protection (e.g., OSHA Standard) and the institution's contact for questions and clarifications.

In order for these competencies to be achieved, it will be important for all workers to have a good and meaningful understanding of each competency. Management must provide the needed resources for competency achievement and workers must apply knowledge

concepts to ingrate respiratory protection into practice. Competency achievement should result in competency certification for each worker.

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Integration of Respiratory Protection into Practice among Health Care Workers

A Users Guide for Respiratory Protection in North Carolina's Hospitals

May 30, 2013

**North Carolina Occupational Health and Safety
Education and Research Center (NC OSHERC)
at the**

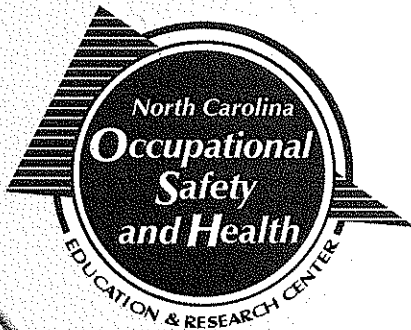
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Chapel Hill, NC 27514

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www.osherc.sph.unc.edu



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INTEGRATION OF RESPIRATORY PROTECTION INTO PRACTICE AMONG HEALTH CARE WORKERS

May 30, 2013

**William and Ida Friday Center for Continuing Education
100 Friday Center Drive, Chapel Hill, NC 27599**

PURPOSE: The purpose of this meeting is to provide information on respiratory protection for health care workers and to identify appropriate strategies for successful implementation of effective respiratory protection programs.

TARGET AUDIENCE: Workers in health care facilities including, but not limited to, staff from employee health, infection prevention, safety/environmental health, nursing, respiratory therapy providers, management.

LEARNING OBJECTIVES:

- Discuss the importance of respiratory protection among health care workers
- List respiratory protection program requirements
- Describe how to fit test for respirator use
- Discuss gaps and deficiencies in respiratory protection programs at health care facilities
- Identify strategies for implementing respiratory protection program at health care facilities

AGENDA

- 7:30 Registration
- 8:30 Introductions and Conference Purpose - Bonnie Rogers
- 8:50 Respiratory Protection for Health Care Workers: Program Requirements - Edie Alfano-Sobsey
- 9:30 Evaluation of Respiratory Protection Programs in NC hospitals - Bonnie Rogers
- 10:15 Break
- 10:30 Fit Testing Demonstration (qualitative and quantitative) - Pat Curran
- 11:15 Donning and Doffing Respirators - Pat Curran
- 12:00 Lunch Break
- 12:45 Joint Commission Tool Kit and Monograph for best practices - Debbie Novak
- 1:00 Panel Discussion: Strategies for Implementing Respiratory Protection Programs at Health Care Institutions and Best Practices with discussion from representatives of each hospital.
Facilitator - Kathleen Buckheit
- 1:45 Next Steps: Focus Groups - Judy Ostendorf
- 2:15 Break
- 2:25 Practice Champions - Bonnie Rogers
- 3:00 Adjourn

Table of Contents

I.	Purpose of This Guide/ Introduction	3
II.	Why Hospitals Need a Respiratory Protection Program	6
	o Respiratory Hazards in the Health Care Setting	
	o The 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings	
	o Table 1. Methods For Controlling Exposure To Aerosol Transmissible Diseases (ATD)	
	o Table 2. Diseases/Pathogens Requiring Droplet Precautions	
III.	Understanding Respiratory Protection	9
	o Respiratory Protection Reduces Inhalation of Aerosols ..	
	o Table 3. Aerosol Transmissible Diseases High Hazard Procedures	
	o Table 4. Examples of Standard Precautions	
	o TB Respiratory Protection Program In Health Care Facilities	
	o Prevention Strategies for Seasonal Influenza in Healthcare Settings by the CDC	
	o Influenza Modes of Transmission	
	o Fundamental Elements to Prevent Influenza Transmission	
	o Healthcare Workers	
IV.	Respirators	16
	o Air-purifying respirators	
	o Atmosphere-supplying respirators	
V.	OSHA Respiratory Protection Standard.....	25
VI.	Developing a Respiratory Protection Program.....	26

Appendices

- o Web Resources
- o Videos Resources
- o Respiratory Protection "Practice Champions" Evaluation Checklist Tool
- o Template : Respiratory Protection Program for Heath Care Facility
- o Respiratory Protection Program Checklist from TB Guidelines
- o OSHA Fact Sheet: Respiratory Infection Control:
Respirators vs Surgical Masks
- o NC Department of Labor A Guide to Respiratory Protection
- o Major Components of OSHA's Respiratory Protection Standard

I. Purpose of This Guide / Introduction

This guide was developed to provide hospital workers in North Carolina with a useful tool for developing and implementing effective respiratory protection programs, with an emphasis on protecting health care workers from aerosol transmissible diseases (ATD). It was prepared by the North Carolina Occupational Safety and Health Education and Research Center (NC OSHERC) (<http://osherc.sph.unc.edu/index.html>) with funding from the National Institute for Occupational Safety and Health (NIOSH) National Personal Protective Technology Laboratory (NPPTL) (<http://www.cdc.gov/NIOSH/NPPTL>).

Hospitals are unique work environments with challenging occupational health and safety issues. Some large hospitals have health and safety personnel who are highly qualified to develop and implement appropriate policies and procedures to control workplace exposures. However, in many smaller facilities with more limited resources, the role of the health and safety professional might be taken on as an added responsibility by someone in the nursing, employee health, occupational health, or infection control department. This guide is written as a practical, step-by-step manual that can be used by anyone who is charged with the task of setting up and maintaining a respiratory protection program.

This guide was developed with funding from a NIOSH grant and information supplied by the North Carolina Occupational Safety and Health education and Research Center (NC OSHERC) and the California Department of Public Health, Occupational Health Branch. You may reproduce any part of it in your policies and procedures. You may also make copies to share with your colleagues.

Disclaimer: Although funding for this project was provided under a contract with the National Institute for Occupational Safety and Health (NIOSH) National Personal Protective Technology Laboratory (NPPTL), the content of these materials was determined by NC OSHERC and should not be construed as NIOSH policy. The depiction of equipment in photographs does not represent an endorsement by NC OSHERC.

Introduction

This manual was developed to assist hospitals in developing and implementing effective respiratory protection programs, with an emphasis on preventing the transmission of **aerosol transmissible diseases** (ATDs) to health care workers. Health care workers are paid and unpaid persons who provide patient care in a health care setting or any person who provides services that support the delivery of health care such as dietary, housekeeping, engineering, and maintenance personnel. Aerosols are particles or droplets suspended in air. ATDs are diseases transmitted when infectious pathogens, which are suspended or present in particles or droplets, contact the mucous membranes or are inhaled.

Hospitals are unique work environments with challenging occupational health and safety issues. Some hospitals have health and safety personnel who are highly qualified to develop and implement appropriate policies and procedures to control workplace exposures. However, in many facilities with more limited resources, the role of the health and safety professional might be taken on as an added responsibility by someone in the nursing, employee health, occupational health, or infection control department. This toolkit is written as a practical manual that can be used by anyone charged with the task of setting up and maintaining a respiratory protection program for reducing employee exposure to hazards that may be inhaled. The toolkit also provides educational resources to reinforce health care workers' proper use of respirators. A respirator is a device worn over the nose and mouth to protect the wearer from hazardous materials in the breathing zone. In health care, the term respirator is also used to describe a mechanical ventilator that helps patients who are having difficulty breathing; this document does not address this type of medical equipment.

The body and appendices of the toolkit include links (indicated by blue font and underlining) to references, resources, and electronic tools such as templates, sample forms, and educational materials. Some of the tools and resources were developed by the authors of this document. Other resources, produced by other organizations and available on the internet, have been identified.



Filtering facepiece respirators being used in health care workplaces

II. Why Hospitals Need a Respiratory Protection Program

Respiratory Hazards in the Health Care Setting

The hospital environment contains hazards such as bacteria, viruses, and chemicals that may be inhaled by workers and cause injury or illness. The approach for reducing exposure required by the Occupational Safety and Health Administration (OSHA) and accepted by health and safety professionals is to use a "hierarchy of controls." This means the most effective controls—the elimination of hazards or substitution of less hazardous processes, chemicals, or products are used first. Next in the hierarchy are engineering controls, which involve isolating the hazard and/or using specialized ventilation (e.g., isolation rooms or laboratory hoods). Where these controls are not feasible or adequate, administrative controls (e.g., providing vaccinations or triaging chemical emergency patients) and work practices (e.g., following respiratory hygiene/cough etiquette strategies or keeping chemical containers capped) are used to minimize the extent or duration of the exposure, or reduce the number of employees exposed. Respirators and other personal protective equipment (PPE) are used as a last line of defense when exposures cannot be reduced to an acceptable level using these other methods.



Airborne droplets visible during sneezing (photo enhanced)

The hazards associated with ATDs (e.g., infectious patients with a transmissible disease or environmental sources of anthrax or fungi) cannot be eliminated from or substituted out of the hospital setting. ATD pathogen exposures cannot routinely be measured in the air, and have no established occupational exposure limits. In addition, ATD pathogens vary in infectivity and severity of outcome. In order to protect employees from ATDs, health care facilities must implement a combination of engineering, administrative (including training and vaccination), and work practice controls, and provide for the use of respirators and other PPE.

Health care workers who care for patients with ATDs must work in close proximity to the source of the hazard, so even with controls in place, they are likely to have a higher risk of inhaling infectious aerosols (droplets and particles) than the general public. These employees, and others with a higher risk of exposure related to the tasks they perform (e.g., lab or autopsy workers), must be protected further through the proper use of respirators. See Table 1 for some examples of methods used for controlling exposures to ATD pathogens in the health care setting.

Table 1. METHODS FOR CONTROLLING EXPOSURE TO AEROSOL TRANSMISSIBLE DISEASES (ATD)

Minimize the number of employees exposed	Minimize the amount of infectious aerosol in the air	Protect employees who must be exposed
Isolate suspected and confirmed cases of airborne infectious disease in negative pressure rooms, to separate the source from all employees not providing direct patient care. Use partitions, barriers, or ventilated enclosures to separate employees from the source of the hazard.	Place a surgical mask on suspected and confirmed ATD cases. Use closed suctioning systems to minimize the dispersion of aerosol.	Provide vaccinations. Use personal protective equipment (PPE), including respirators.

The 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings

The 2007 HICPAC Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings applies to health care workplaces, including hospitals, long-term care facilities, ambulatory care, home care and hospice, which have the potential to expose employees to ATD pathogens. This guidance recommends that respiratory protection be used to protect certain workers performing specific tasks and that the use of respirators comply with the OSHA respiratory protection standard (29 CFR 1910.134; discussed in more detail in a following section).

The 2007 HICPAC Guideline serves as a primary resource supporting respirator use policies in health care supplemented by newer guidance issued by CDC, OSHA, public health departments, as well as by relevant scientific literature.

HICPAC has categorized each ATD by its mode of transmission (droplet or airborne) and specified the applicable Transmission-Based Precautions for that pathogen (i.e., Droplet or Airborne Precautions); see the boxes on the next two pages for complete listings.



Health care worker wearing a filtering facepiece respirator

In developing its guidance, HICPAC considered epidemiological studies of disease outbreaks, experimental studies, and information on aerosol behavior, and reflects the committee's opinion at that time. However, in most cases the relative contribution of each mode of transmission is not fully understood. HICPAC and other public health guidance should be regularly reviewed the science develops so that the most up-to-date information is used to select respiratory protection. (See Table 1).

HICPAC describes the distinction between droplet transmission and airborne transmission based on particle size and the distance and time over which the pathogens remain infective. HICPAC indicates that droplets responsible for droplet transmission have traditionally been defined as being greater than 5 micrometers in diameter, while the particles or "droplet nuclei" responsible for airborne transmission are less than 5 micrometers in diameter and remain airborne and infectious long enough to travel substantial distances (e.g., through a ventilation system). Although a distance of 3 feet had traditionally been used to define the area of risk when working with patients suspected or known to have diseases requiring Droplet Precautions, HICPAC reports that infection has occurred at distances greater than 3 feet. Thus, HICPAC states that observing Droplet Precautions at a distance up to 6 or 10 feet or upon entry into the patient's room may be prudent (See Table 2).

Table 2. Diseases/Pathogens Requiring Droplet Precautions

- Diphtheria pharyngeal
- Epiglottitis, due to *Haemophilus influenzae* type b
- *Haemophilus influenzae* Serotype b (Hib) disease/ *Haemophilus influenzae* serotype b--
Infants and children
- Influenza, human (typical seasonal variations)/influenza viruses*
- Meningitis
 - *Haemophilus influenzae*, type b known or suspected
 - *Neisseria meningitidis* (meningococcal) known or suspected
 - Meningococcal disease sepsis, pneumonia (see also meningitis)
- Mumps (infectious parotitis)/Mumps virus
- Mycoplasmal pneumonia
- Parvovirus B19 infection (erythema infectiosum)
- Pertussis (whooping cough)
- Pharyngitis in infants and young children/Adenovirus, Orthomyxoviridae, Epstein-Barr virus, Herpes simplex virus
- Pneumonia
 - Adenovirus
 - *Haemophilus influenzae* Serotype b, infants and children
 - Meningococcal
 - Mycoplasma, primary atypical
 - Streptococcus Group A
- Pneumonic plague/*Yersinia pestis*
- Rubella virus infection (German measles)/Rubella virus
- Severe acute respiratory syndrome (SARS)
- Streptococcal disease (group A streptococcus)
 - Skin, wound or burn, Major
 - Pharyngitis in infants and young children
 - Pneumonia
 - Scarlet fever in infants and young children
 - Serious invasive disease
- Viral hemorrhagic fevers due to Lassa, Ebola, Marburg, Crimean-Congo fever viruses (airborne infection isolation and respirator use may be required for aerosol-generating procedures)
- Any other disease for which public health guidelines recommend droplet precautions

<http://www.cdph.ca.gov/programs/ohb/documents/HCRsp-ATD-RespSelectGuide.pdf>

III. Understanding Respiratory Protection

Respiratory Protection Reduces Inhalation of Aerosols

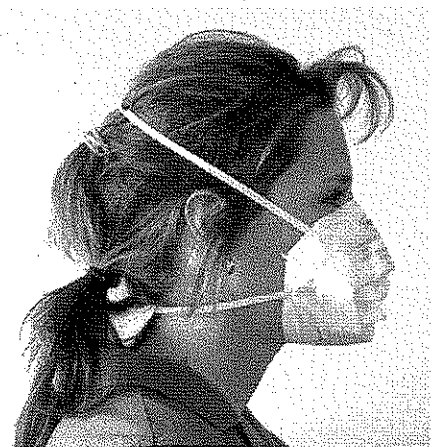
In order to understand how respirators can be used to protect health care workers, it is important to understand what a respirator is and what it is not. One important distinction that must be made when discussing respirator use in health care settings is the difference between **respirators** and **facemasks**. Facemasks include surgical masks, which are fluid resistant, and procedure or isolation masks which are not fluid resistant. While some people may call both respirators and facemasks “masks,” this is incorrect as they are very different in their design, performance, and purpose.

The purpose of a facemask, when worn by a health care worker, is twofold. As part of “Droplet Precautions” (explained in more detail later in this document), the surgical mask is worn to protect the wearer from large droplets or sprays of infectious body fluids from patients that otherwise could be directly transmitted to the mucous membranes in the worker’s nose or mouth. In other instances, a facemask is worn by a health care worker to protect patients by reducing the amount of large droplets with infectious agents the wearer could introduce into the room by talking, sneezing, or coughing; this protection is especially important in sterile environments, such as operating rooms, or when working with potentially immune-compromised patients.



Health care worker in a surgical mask

The purpose of a facemask, when worn by a patient suspected or confirmed with an illness such as influenza or tuberculosis, is to reduce the amount of large infectious particles released as the patient talks, sneezes, or coughs; this limits their concentration in the room air and reduces the infection risk to others who are present. However, facemasks by design do not seal tightly to the wearer’s face. Therefore, they allow unfiltered air to easily flow around the sides of the facemask and be inhaled by the wearer. In addition, the materials used for facemasks are not regulated for their ability to filter particles and are known to vary greatly between models. This makes it possible for small particles to pass through or around the facemask and be inhaled by the worker.



filtering facepiece respirator

This is why they are not considered respiratory protection—facemasks do NOT provide the wearer with a reliable level of protection from inhaling smaller particles which are emitted into the room air by a patient exhaling or coughing, or by conducting certain medical procedures.

The purpose of a respirator is to protect the wearer by reducing the concentration of contaminants in the air inhaled by the wearer. In a hospital setting, these contaminants may come from procedures using hazardous drugs (including some cancer chemotherapy drugs, antiviral drugs, hormones, and bioengineered drugs) and chemicals (e.g., anesthetic waste gases or equipment sterilization); cleaning and maintenance activities; from infectious patients who are exhaling, talking, sneezing, or coughing in the room in which the health care worker is working; from medical procedures performed on infectious patients (e.g., using bone saws); or from laboratory procedures (e.g., operating centrifuges, blenders, or aspirating equipment) that may aerosolize pathogens.

Respirators can provide this protection in a number of different ways, depending on the type of respirator, for example, filtering facepiece respirators are designed to seal tightly to the face when the proper model and size is selected for the individual using a fit-test procedure. The wearer can then be assured that inhaled air is forced through the filtering material, which allows contaminants to be captured and reduces exposure to infectious particles of all sizes. Respirators are designed and regulated to provide a known level of protection when used within the context of a comprehensive and effective respiratory protection program.

Also available, and widely used in health care, is the **surgical respirator**—a filtering facepiece respirator with spray- or splash-resistant facemask material on the outside to protect the wearer from splashes (sometimes referred to as “surgical N95 respirators”). A **two-page factsheet** <http://www.osha.gov/Publications/respirators-vs-surgicalmasks-factsheet.pdf> and a short video, in **English** <http://www.osha.gov/video/20091216-respirator-1-english-high.wmv> and **Spanish** <http://www.osha.gov/video/20091216-respirator-1-spanish-high.wmv>, on the differences between facemasks and respirators are available from OSHA as training resources.

Use Caution when Performing Aerosol-Generating Procedures

CDC also recommends the use of respiratory protection at least as effective as fit tested N95 respirators, as well as airborne infection isolation, when high hazard (aerosol-generating) procedures are performed on patients with suspected or confirmed influenza (See Table 3). This recommendation raises the issue of whether respirator use during high hazard procedures should also be considered for other infectious diseases (e.g., pertussis, meningococcal disease) that currently call for droplet precautions.

Some procedures performed on patients with suspected or confirmed influenza infection may be more likely to generate higher concentrations of infectious respiratory aerosols than coughing, sneezing, talking, or breathing. These procedures potentially put Health Care Professional (HCP) at an increased risk for influenza exposure (See Table 3). These include some procedures that are usually planned ahead of time, such as

bronchoscopy, sputum induction, elective intubation and extubation, and autopsies; and some procedures that often occur in unplanned, emergent settings and can be life-saving, such as cardiopulmonary resuscitation, emergent intubation and open suctioning of airways. Ideally, a combination of measures should be used to reduce exposures from these aerosol-generating procedures when performed on patients with suspected or confirmed influenza. However, it is appropriate to take feasibility into account, especially in challenging emergent situations, where timeliness in performing a procedure can be critical to achieving a good patient outcome.

**Table 3. Aerosol Transmissible Diseases
High Hazard Procedures**

- High hazard procedures are “procedures performed on a person who is a case or suspected case of an aerosol transmissible disease (or on a specimen suspected of containing an aerosol transmissible pathogen in a laboratory), in which the potential for being exposed to aerosol transmissible pathogens is increased due to the reasonably anticipated generation of aerosolized pathogens.”
- Such procedures include, but are not limited to:
 - Sputum induction
 - Bronchoscopy
 - Aerosolized administration of pentamidine or other medications
 - Pulmonary function testing
 - Autopsy, clinical, surgical, and laboratory procedures that may aerosolize pathogens.

CDC's guidance titled Prevention Strategies for Seasonal Influenza in Healthcare Settings contains details on the prevention strategies for all health care settings. Specific recommendations are highlighted below. Standard Precautions (See Table 4) are intended to be applied to the care of all patients in all health care settings, regardless of the suspected or confirmed presence of an infectious agent. Implementation of Standard Precautions constitutes the primary strategy for the prevention of healthcare-associated transmission of infectious agents among patients and health care personnel.

Table 4. Examples of Standard Precautions

- Wearing gloves if hand contact with respiratory secretions or potentially contaminated surfaces is anticipated.
- Wearing a gown if soiling of clothes with a resident's respiratory secretions is anticipated.
- Changing gloves and gowns after each resident encounter and using hand hygiene.
- Perform hand hygiene before and after touching the resident, after touching the resident's environment, or after touching the resident's respiratory secretions, whether or not gloves are worn. Gloves do not replace the need for performing hand hygiene.

TB Respiratory Protection Program In Health Care Facilities

<http://www.cdc.gov/niosh/docs/99-143/pdfs/99-143.pdf>

According to **Administrator's Guide from NIOSH**, the use of respirators in the health care setting is a relatively new but important step forward in the efforts to prevent the transmission of tuberculosis (TB). Air purifying respirators provide a barrier to prevent health care workers from inhaling *Mycobacterium tuberculosis*. The level of protection a respirator provides is determined by the efficiency of the filter material and how well the facepiece fits or seals to the health care worker's face. A number of studies have shown that surgical masks will not provide adequate protection in filtering out the TB organism. Additionally, surgical masks are not respirators and therefore, are not NIOSH certified and do not satisfy OSHA requirements for respiratory protection. The proper use of respirators represents a significant improvement in employee protection against TB. NIOSH realizes that the use of respirators involves a number of new and perhaps confusing practices for the health care community. The manual is designed to serve as a practical guide for those individuals responsible for initiating and running a TB respiratory protection program in health care facilities.

Prevention Strategies for Seasonal Influenza in Healthcare Settings by the CDC

<http://www.cdc.gov/flu/professionals/infectioncontrol/healthcaresettings.htm>

Guidelines and Recommendations

This guidance supersedes previous CDC guidance for both seasonal influenza and the Interim Guidance on Infection Control Measures for 2009 H1N1 Influenza in Healthcare Settings, which was written to apply uniquely to the special circumstances of the 2009 H1N1 pandemic as they existed in October 2009.

As stated in that document, CDC planned to update the guidance as new information became available. In particular, one major change from the spring and fall of 2009 is the widespread availability of a safe and effective vaccine for the 2009 H1N1 influenza virus. Components of this vaccine have been included in the 2010-2011 trivalent seasonal vaccine. Second, the overall risk of hospitalization and death among people infected with this strain was uncertain in spring and fall of 2009, but is now known to be substantially lower than pre-pandemic assumptions. In addition, more information has been recently published or presented indicating that face mask use and hand hygiene reduce the risk of influenza infection in health care and household settings. The current circumstances and new information justify an update of the recommendations.

This updated guidance continues to emphasize the importance of a comprehensive influenza prevention strategy that can be applied across the entire spectrum of healthcare settings. CDC will continue to evaluate new information as it becomes available and will update or expand this guidance as needed. Additional information on influenza prevention, treatment, and control can be found on Seasonal Influenza (Flu) web site.

Influenza is primarily a community-based infection that is transmitted in households and community settings. Each year, 5% to 20% of U.S. residents acquire an influenza virus infection, and many will seek medical care in ambulatory healthcare settings (e.g., pediatricians' offices, urgent-care clinics). In addition,

more than 200,000 persons, on average, are hospitalized each year for influenza-related complications. Healthcare-associated influenza infections can occur in any healthcare setting and are most common when influenza is also circulating in the community. Therefore, the influenza prevention measures outlined in this guidance should be implemented in all healthcare settings. Supplemental measures may need to be implemented during influenza season if outbreaks of healthcare-associated influenza occur within certain facilities, such as long-term care facilities and hospitals [refs: Infection Control Measures for Preventing and Controlling Influenza Transmission in Long-Term Care Facilities]

Influenza Modes of Transmission

Traditionally, influenza viruses have been thought to spread from person to person primarily through large-particle respiratory droplet transmission (e.g., when an infected person coughs or sneezes near a susceptible person). Transmission via large-particle droplets requires close contact between source and recipient persons, because droplets generally travel only short distances (approximately 6 feet or less) through the air. Indirect contact transmission via hand transfer of influenza virus from virus-contaminated surfaces or objects to mucosal surfaces of the face (e.g., nose, mouth) may also occur. Airborne transmission via small particle aerosols in the vicinity of the infectious individual may also occur; however, the relative contribution of the different modes of influenza transmission is unclear. Airborne transmission over longer distances, such as from one patient room to another has not been documented and is thought not to occur. All respiratory secretions and bodily fluids, including diarrheal stools, of patients with influenza are considered to be potentially infectious; however, the risk may vary by strain. Detection of influenza virus in blood or stool in influenza infected patients is rare.

Fundamental Elements to Prevent Influenza Transmission

Preventing transmission of influenza virus and other infectious agents within healthcare settings requires a multi-faceted approach. Spread of influenza virus can occur among patients, HCP, and visitors; in addition, HCP may acquire influenza from persons in their household or community. The core prevention strategies include:

- administration of influenza vaccine
- implementation of respiratory hygiene and cough etiquette
- appropriate management of ill HCP
- adherence to infection control precautions for all patient-care activities and aerosol-generating procedures
- implementing environmental and engineering infection control measures.

Successful implementation of many, if not all, of these strategies is dependent on the presence of clear administrative policies and organizational leadership that promote and facilitate adherence to these recommendations among the various people within the healthcare setting, including patients, visitors, and HCP.

Health Care Personnel

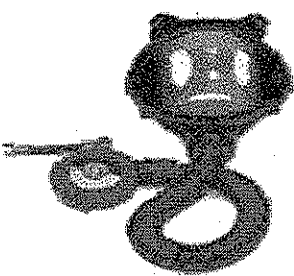
A surgical or procedure mask should be worn by health-care personnel who are in close contact (i.e., within 3 feet) with a patient who has symptoms of a respiratory infection, particularly if fever is present, as recommended for standard and droplet precautions. These precautions should be maintained until the patient has been determined to be noninfectious or for the duration recommended for the specific infectious agent.

Airborne transmission occurs through very small particles or droplet nuclei that contain infectious agents and can remain suspended in air for extended periods of time. When they are inhaled by a susceptible individual, they enter the respiratory tract and can cause infection. Since air currents can disperse these particles or droplet nuclei over long distances, airborne transmission does not require face-to-face contact with an infected individual. Airborne transmission only occurs with infectious agents that are capable of surviving and retaining infectivity for relatively long periods of time in airborne particles or droplet nuclei. Only a limited number of diseases are transmissible via the airborne route. Two examples of airborne transmissible agents include *Mycobacterium tuberculosis* which causes tuberculosis (TB) and the rubella virus which causes measles.

Health care workers who care for patients with ATHs must work in close proximity to the source of the hazard, so even if the room has enhanced ventilation, they are likely to have a higher risk of inhaling infectious aerosols (particles). Exposure of these employees, and others with a higher risk of exposure related to the tasks they perform, can be reduced further by the proper use of respirators.

IV. Respirators

Air-purifying vs. Atmosphere-supplying Respirators

	
Air-purifying Respirators	Atmosphere-supplying Respirators
▪ have filters, cartridges, or canisters that remove contaminants from the air by passing the ambient air through the air-purifying element before it reaches the user.	▪ supply clean air directly to the user from a source other than the air surrounding the user.

1. Air-Purifying Respirators

Air-purifying respirators (APRs) work by removing gases, vapors, and particulates (mists and solid particles) or combinations of gases, vapors, and/or particulates from the air through the use of filters, cartridges, or canisters. To help employees identify the specific chemicals for which the cartridges are designed, all filters, cartridges, and canisters must be labeled and color-coded with a label approved by NIOSH. APRs with filters will remove particles (also called aerosols) from the inhaled air, while those with cartridges or canisters are designed to remove gases and vapors.

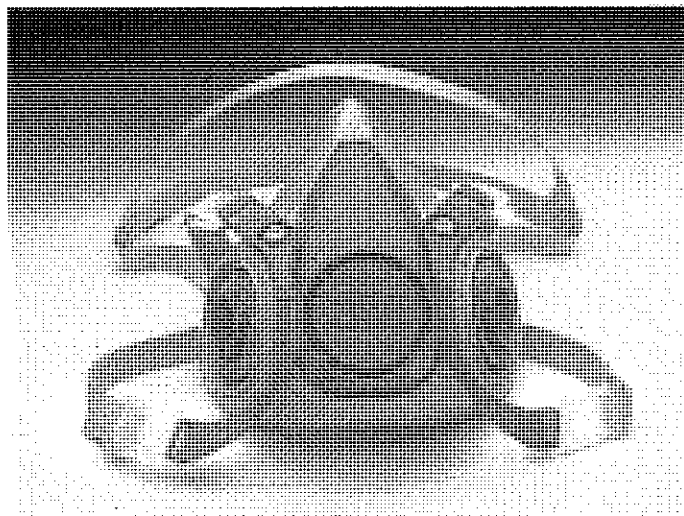
Different types of respirators are designed to protect against different hazards. The type of airborne contaminant, its concentration, and its potential to cause a health effect in exposed workers dictate the type of



respirator that must be worn. Respirators are available in many types, models, and sizes from several manufacturers for a variety of applications. All respirators used in the workplace must be tested by the manufacturer and approved by the National Institute for Occupational Safety and Health (NIOSH).

The half-mask respirator

also meets CDC requirements. This respirator has single or dual filters made of the same material as the N, R, and P disposable respirators (HEPA filters can also be used). Most manufacturers produce more than one size. A face shield may also be used in conjunction with a half-mask particulate filter respirator for protection against body fluids. Described below are two major types of respirators: air-purifying respirators and atmosphere-supplying respirators.



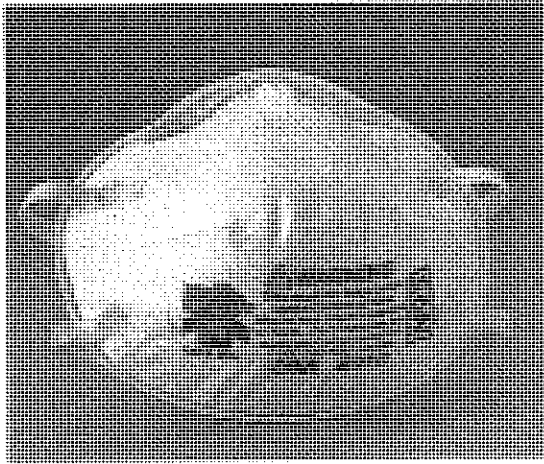
The full facepiece respirator

also meets CDC requirements for respiratory protection against exposure to TB. The respirator can be equipped with the N, R, or P filters (HEPA filters can also be used). It is also manufactured in more than one size.

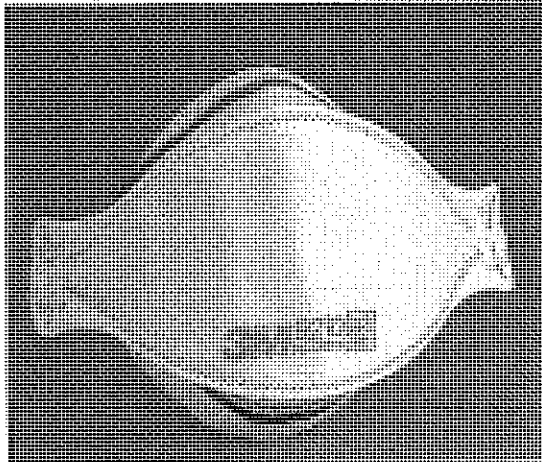


Types of air-purifying respirators

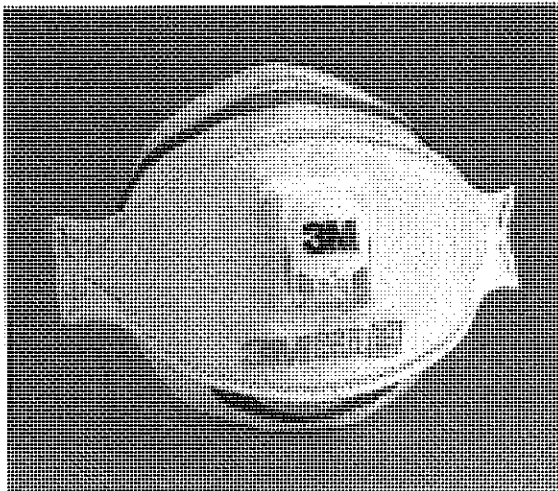
Non-powered respirators



Non-powered respirators have a tight-fitting facepiece, which can be either a half mask that covers the nose and mouth or a full facepiece (covers the nose, mouth, and eyes). They may be reusable, elastomeric respirators that have replaceable filters or cartridges for removing contaminants, or disposable filtering facepiece respirators where the entire facepiece is made of filtering material.



“N95 respirator” is a term used to refer to a filtering facepiece APR with an approved N95 filter. Approved N95 respirators are also available with surgical mask material on the outside to protect the wearer from splashes. See the box below for more information on different classes of NIOSH-approved filters.



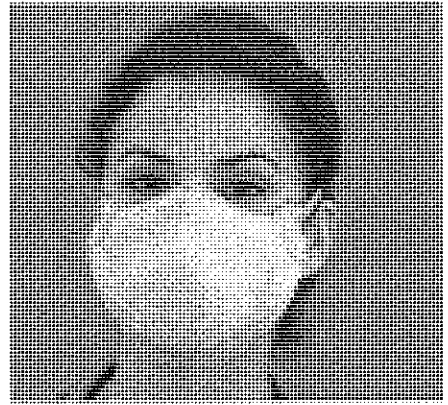
To retain the respirator's assigned protection factor (APF), you must:

- be fit-tested;
- use the correct size respirator;
- make sure the seal check has a good seal;
- provide maintenance for the respirator;
- ensure it is in good condition;
- doff and don according to manufacturer's instructions.

Always read and follow the manufacturer's directions for your respirator.

Disposable Particulate Respirators

The NIOSH-certified disposable respirators labeled N, R, or P meet CDC criteria and may be obtained with (right) or without (left) exhalation valves are pictured below. Most manufacturers also produce them in different sizes. A face shield may also be used in conjunction with a half-mask disposable respirator for protection against body fluids.

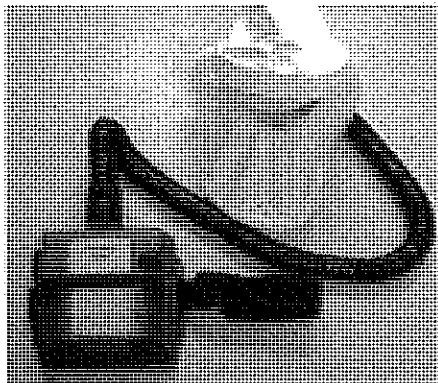
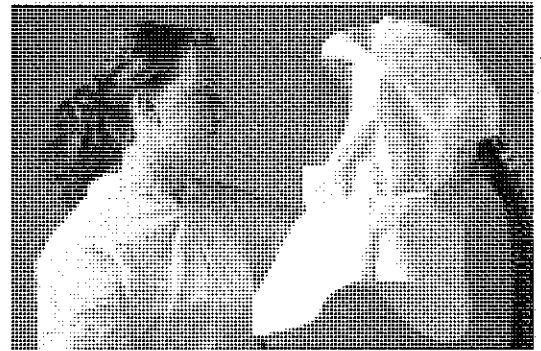


It is important to check that your disposable respirator fits properly each time you wear it. To "Seal Check" a disposable respirator, cup both of your hands over the mask and inhale. The mask should pull in toward your face. If the mask does not pull in, or if you feel air leaks around the edges of the mask, readjust the nose piece and straps and try again until you get a good fit.

For general guidance, keep track of your disposable respirator and do not share it with other workers. Inspect it before and after each use. Replace the respirator if it develops holes, the straps break or loosen, or it becomes dirty and overly contaminated. Be sure to store your respirator in an area that is free of dirt and contaminants. If the disposable respirator gets splashed with chemicals or other liquid materials while you are working, exit the work area and remove it immediately. If it becomes difficult to breathe through the disposable respirator, exit the work area, throw it away, and replace it with a new respirator. Properly adjust and fit test the new disposable respirator before you re-enter the work zone.

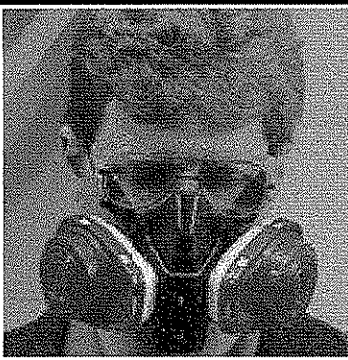
2. Powered air-purifying respirators

Powered air-purifying respirators (PAPRs) can have a tight-fitting facepiece or a hood, helmet, or other type of loose-fitting facepiece. PAPRs have a battery-powered blower that pulls the air in the room through filters (for particles) or cartridges (for gases/vapors) to clean it before delivering it to the breathing zone of the wearer. cartridges (for gases/vapors) to clean it before delivering it to the breathing zone of the wearer.



The most protective type of PAPR is equipped with a filter and chemical cartridge. These PAPRs have a tight-fitting full-facepiece, or a hood or helmet with a collar or inner shroud, and a combination HEPA filter and chemical cartridge. They must be a type that will reduce the exposure of the wearer to 1/1000th of the concentration that is in the air.

Three Kinds of Air-purifying Respirators

		
Particulate Respirators	Combination Respirators	Gas & Vapor Respirators
▪ capture particles in the air, such as dusts, mists, and fumes ▪ do not protect against gases or vapors ▪ generally become more effective as particles accumulate on the filter and plug spaces between the fibers ▪ filters should be replaced when user finds it difficult to breathe through them	▪ are normally used in atmospheres that contain hazards of both particulates and gases ▪ have both particulate filters and gas/vapor filters ▪ may be heavier	▪ are normally used when there are only hazardous gases and vapors in the air ▪ use chemical filters (called cartridges or canisters) to remove dangerous gases or vapors ▪ do not protect against airborne particles ▪ are made to protect against specific gases or vapors ▪ provide protection only as long as the filter's absorbing capacity is not depleted ▪ the service life of the filter depends upon many factors and can be estimated in various ways

2. Atmosphere-Supplying Respirators

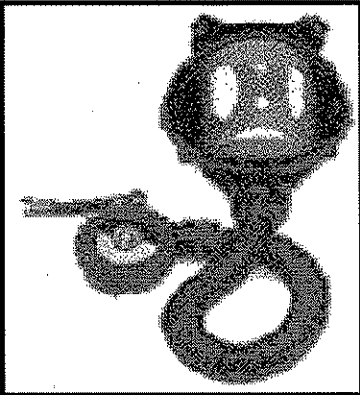
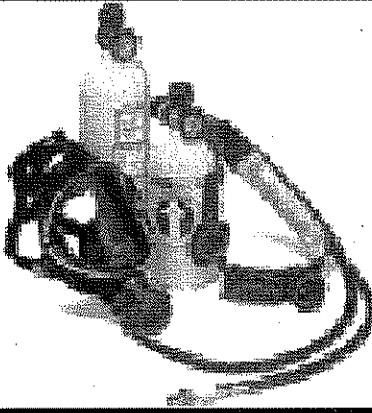
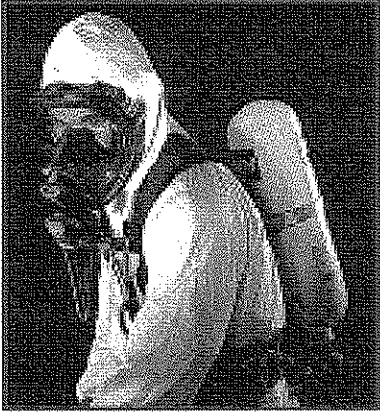
Atmosphere-supplying respirators work by providing clean breathing air from an uncontaminated source. These respirators consist of a tight-fitting facepiece, a hood, a helmet, or other type of loose-fitting facepiece, and breathing air which is supplied by a compressor or a pressurized cylinder. They do



not require filters or cartridges and will protect the wearer from all types of contaminants present (particles or gases/vapors). These respirators are less likely to be used in a hospital setting except, perhaps, by emergency responders or construction contractors.



Three Kinds of Atmosphere-supplying Respirators

		
Air-Supplied Respirators	Combination Respirators	Self-Contained Breathing Apparatus
▪ uses a hose to deliver clean, safe air from a stationary source of compressed air ▪ provides clean air for long periods of time and are light weight for the user ▪ limits the range of user-mobility and may fail due to hose damage ▪ called airline respirators ▪ normally used when there are extended work periods required in atmospheres that <u>are not</u> immediately dangerous to life and health (IDLH)	▪ have auxiliary self-contained air supply that can be used if the primary supply fails ▪ self-contained portion can be small since it only needs to supply enough air for escape ▪ can be used for entry into confined spaces ▪ normally used when there are extended work periods required in atmospheres that <u>are or may be</u> immediately dangerous to life and health (IDLH)	▪ consists of a wearable, clean-air supply pack ▪ no restriction of movement with a hose connection ▪ closed-circuit type provides air up to 4 hours ▪ open-circuit type only provides air for 30 - 60 minutes ▪ normally used when there is a short-time need to enter and escape from atmospheres which <u>are or may be</u> immediately dangerous to life and health (IDLH)

- Employers are required to provide employees using atmosphere-supplying respirators (supplied air and self-contained breathing apparatus) with breathing gases of high purity, and shall ensure that compressed air, compressed oxygen, liquid air, and liquid oxygen used for respiration is in accordance with the specifications of OSHA Standard 29 CFR 1910.134(i).

Filters are classified according to what they are able to filter and how efficiently they perform.

9 Classes of NIOSH-approved Respirator Filters and Filtering Facepieces	
Class	Description
N95	Filters at least 95% of airborne particles. Not resistant to oil.
N99	Filters at least 99% of airborne particles. Not resistant to oil.
N100	Filters at least 99.97% of airborne particles. Not resistant to oil.
R95	Filters at least 95% of airborne particles. Somewhat resistant to oil.
R99	Filters at least 99% of airborne particles. Somewhat resistant to oil.
R100	Filters at least 99.97% of airborne particles. Somewhat resistant to oil.
P95	Filters at least 95% of airborne particles. Strongly resistant to oil.
P99	Filters at least 99% of airborne particles. Strongly resistant to oil.
P100	Filters at least 99.97% of airborne particles. Strongly resistant to oil.

N = Not Resistant to Oil;

R = Resistant to Oil;

P = Oil-proof

Respirator Selection Guide for Aerosol Transmissible Diseases

Disease	Job Task	Respirator
Airborne infectious disease (suspected or confirmed)	Routine patient care & support operations	At least N95
	High hazard procedures	At least PAPR
Seasonal Influenza (suspected or confirmed)	Routine patient care & support operations	In accordance with facility policy; CDPH recommends at least permitting optional N95 use
	High hazard procedures	At least N95
Other diseases requiring droplet precautions	In accordance with facility policy	

ADVANTAGES AND DISADVANTAGES OF VARIOUS RESPIRATOR FACEPIECE STYLES

Adapted from: USACHPPM. 2003a. Personal Protective Equipment Guide for Military Medical Treatment Facility Personnel Handling Casualties from Weapons of Mass Destruction and Terrorism Events (Technical Guide 275). August 2003.

FACEPIECE STYLE	ADVANTAGES	DISADVANTAGES
Half facepiece	Employee may wear any appropriate eyewear that does not interfere with the respirator seal.	- If there is a break in the seal between the mask and the face, contaminated air can enter. Fit testing must be performed prior to use and user seal checks must be done by the user every time the respirator is used. - Does not provide eye protection.
Full facepiece	- When used with a powered air-purifying respirator (PAPR), a tight fitting facepiece might allow a worker to pull filtered air into the facepiece if the battery fails. - Provides eye protection.	- If there is a break in the seal between the mask and the face, contaminated air can enter. Fit testing must be performed prior to use and user seal checks must be done by the user every time the respirator is used. - Workers who wear glasses may require spectacle kits to be used inside the facepiece.
Loose fitting helmet/hood	- Provides eye protection. - Provides skin protection for the head and (certain models) neck. - Fit testing is not required. - Some workers find loose fitting respirators more comfortable than tight fitting models. - Can be worn by employees with facial hair and facial scars/deformities. - Employees may wear their own glasses under the helmet/hood.	When used with a PAPR, the hood will provide little or no protection if the battery fails.
Adapted from <i>Personal Protective Equipment Guide for Military Medical Treatment Facility Personnel Handling Casualties from Weapons of Mass Destruction and Terrorism Events</i> (Technical Guide 275). U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM), August 2003.		

V. The OSHA Respiratory Protection Standard

In North Carolina, the N.C. Department of Labor (NC DOL) enforces the federal Occupational Safety and Health Act (OSHA) through a state plan approved by the U.S. Department of Labor. North Carolina employers must follow the federal OSHA Respiratory Protection Standard (**29 CFR 1910.134**). All employers, including hospitals, who have workers who must use respiratory protection to control exposures to airborne contaminants, must comply.

The first respirator approval was issued in 1920 for a self-contained breathing apparatus (SCBA). Following this, other federal respiratory protection standards were developed, leading to the present OSHA respiratory protection standard, (http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_id=12716&p_table=standards) and to the current certification and approval of respirators by the National Institute for Occupational Safety and Health (NIOSH). These rules were initially promulgated under 30 CFR Part 11 and were later re-codified to 42 CFR Part 84 (<http://www.cdc.gov/niosh/npptl/topics/respirators/pt84abs2.html>).

Another reference is the OSHA "Instruction for Inspection Procedures for the Respiratory Protection Standard" (http://www.osha.gov/OshDoc/Directive_pdf/CPL_2-0_120.pdf). North Carolina also has an additional general Operational Procedure Notice (<http://www.nclabor.com/osha/compliance/publicopn/opn127.pdf>) and one for Facial Hair and respirator use (<http://www.nclabor.com/osha/PublicSN/SN55A.pdf>).

The respiratory protection standard requires that all employers who must use respirators to control hazardous exposures have a comprehensive and effective respiratory protection program (RPP). The program must be in writing and is intended to specify the policies and procedures for the use of respiratory protection in the facility. OSHA requires each respiratory protection program to include several specific elements, but leaves the specifics of these policies and procedures up to individual employers. See Table 3 for a summary of the key requirements of the standard.

VI. Developing a Respiratory Protection Program

Assigning Responsibility

A key component to a successful respiratory protection program (RPP) is the assignment of responsibilities for the implementation and administration of the program. Cal/OSHA requires that "the program be administered by a suitably trained program administrator." Although the program administrator does not have to be a health and safety professional, he/she must have expertise in the principles of respiratory protection.

Hazard Evaluation

The purpose of the hazard evaluation is to identify potential exposures in the workplace that might require the use of respiratory protection so that these hazards can be quantified to the extent feasible and appropriate respiratory protection can be selected.

The hazard evaluation must be completed for all respiratory hazards, including chemical exposures as well as exposure to infectious diseases. The selection of respirators for infectious diseases must be done according to anticipated exposure by task according to public health guidance and following the requirements of the OSHA Respiratory Protection Standard. When conducting a hazard evaluation in the patient care setting, it is useful to start with the requirements of the RRP standard and systematically consider all of the activities in your units.

Policies and Procedures

Once you have determined who will administer the program and which employees will be included, you are ready to develop the written policies and procedures that will make up your written RPP. You may find that customizing a template is the easiest way to develop your written program. Then the policies and procedures must be clearly communicated to all staff. There is a sample program available on the NC DOL web site (http://www.nclabor.com/osha/consult/sample_programs.htm). You may find that customizing this template is the easiest way to develop your written program. If you choose to do this, it is best to use this guide and the template together.

Respirator Selection

Document the results of your hazard evaluation and determine which types of respirators will be used by specific staff or job titles, and for specific tasks or procedures based on the hazard and type of exposure. This establishes minimum respirator requirements for certain tasks and infectious agents. However, employers are always responsible to assess respiratory hazards, and the requirements in the OSHA standard are only minimum requirements.

- **What is the identity and nature of the airborne contaminant?**

Specific characteristics of the airborne hazard must be established in order to select an appropriate respirator.

- Is the airborne contaminant a particulate (dust, fumes, mist, aerosol) or a gas/vapor?
- Is the airborne contaminant a chemical and are material safety data sheets available?
- Is the airborne contaminant a biological (bacteria, mold, spores, fungi, virus)?
- Are there any mandatory or recommended occupational exposure levels for the contaminant?

- **Factors That Can Influence Respirator Selection**

- ✓ **The Physical Configuration of the Jobsite**

Tightly constrained areas may not permit the use of self-contained breathing apparatuses even though they might be an acceptable choice otherwise. Likewise, working around obstructions or moving machinery that can snag hoses may limit the use of airline respirators.

- ✓ **Worker Medical Condition**

Wearing respiratory protection poses a physical burden on the wearer. When a worker's medical condition would prohibit restrictive breathing conditions, negative pressure respirators would not be an appropriate choice.

- ✓ **Worker Comfort**

Worker preferences should be a consideration during the respirator selection process. Among air purifying respirators, powered air purifying helmets have been subjectively rated the best for breathing ease, skin comfort, and in-mask temperature and humidity while filtering facepieces rated high for lightness and convenience. Each, however, has its own drawbacks, and all these factors should be taken into account during selection.

Key Requirements	
OSHA Respiratory Protection Standard	
✓	Written respiratory protection program with policies and procedures
✓	Designation of a Program Administrator
✓	Procedures for hazard evaluation and respirator selection
✓	Medical evaluation of respirator wearers
✓	Fit testing procedures for tight-fitting respirators
✓	Procedures for proper use, storage, maintenance, repair, and disposal of respirators
✓	Training
✓	Program evaluation including consultation with employees
✓	Recordkeeping

The North Carolina Department of Health and Human services also has policies and procedures for Respiratory Program Requirements

(http://info.dhhs.state.nc.us/olm/manuals/dhs/pol-50/man/Pol5_SB_Respiratory_Protect1.htm).

Wearing the Respirator

The respirator must cover both the nose and mouth to guard the wearer from particulates in the atmosphere. If the respirator does not have a tight fit it will not work properly. Correct fit of the respirator requires contact with smooth skin. It will not work properly for people with beards or facial hair. Even one-day beard growth has been shown to let air leak in.

Checking to Make Sure It Fits

Always use both straps on the respirator to hold it in place to keep air from leaking around the respirator. Do a user seal check to verify that you have correctly put on the respirator and adjusted it to fit properly. To check the respirator-to-face seal, place both hands completely over the respirator and inhale sharply. Be careful not to disturb the position of the respirator. The respirator should pull into your face. If air leaks around the nose, readjust the nosepiece. If air leaks at the respirator edges, work the straps back along the sides of your head. Redo the user seal check. Then put your hands over the respirator and breathe out sharply. No air should escape. If your respirator has an exhalation valve (like the one pictured above) be sure to cover the exhalation valve when you exhale. If the respirator fits properly no air will leak out of the respirator. If air leaks out re-adjust the respirator and exhale again covering the exhalation valve.

When to Throw Out the Respirator

As the respirator becomes clogged, resistance to air flow increases and it becomes more difficult to breathe. When this occurs the respirator should be discarded and a new one used. Also discard the respirator if it gets wet; is deformed (because it may not fit properly); is dirty on the inside part next to your nose; or the filter is torn and will not filter the air. This respirator cannot be cleaned or disinfected.

Medical Requirements

Employees need to be medically cleared to wear respirators before commencing use. All respirators generally place a burden on the employee. Negative pressure respirators restrict breathing, some respirators can cause claustrophobia and self-contained breathing apparatuses are heavy. Each of these conditions may adversely affect the health of some employees who wear respirators. A physician or other licensed health care professional operating within the scope of his/her practice needs to medically evaluate employees to determine under what conditions they can safely wear respirators.

Appendix C of the OSHA Respiratory Protection Standard is a questionnaire that includes information that must be reviewed by a physician or other licensed health care professional (PLHCP) either in questionnaire format, or in person during a visit to the PLHCP. The PLHCP may be a hospital employee, but must not be the employee's supervisor. If the hospital does not have internal occupational health services, the PLHCP may be a contracted provider. The

best outside sources for such evaluations are occupational medicine providers or clinics. These clinics provide medical clearance for respirator use and may also provide fit testing services.

Make sure you are clear where the questionnaires will be sent for evaluation, and describe these procedures in your written RPP. The completed questionnaires are considered personal health information, so there must be a procedure by which they are confidentially provided to the PLHCP. Completed questionnaires should be maintained as confidential medical records and not be accessible to the employee's supervisor. Further evaluation may be required if any positive responses are given to Questions 1-8 of the OSHA Respiratory Protection Standard Appendix C Questionnaire. Not all respirator medical approvals require a Pulmonary Function Test or Chest X-ray, but some do. Based on the hazard exposure, check OSHA -specific standards (i.e., asbestos and cotton dust).

Based on the answers to the questionnaire, as well as on a physical exam or any other tests the PLHCP deems necessary, the PLHCP must make a determination as to whether the individual can safely wear the respirator. Information that is useful for the medical evaluation of respirator users is provided in ANSI / AIHA Z88 .6-2006, a voluntary consensus standard. The PLHCP must inform the employer (RPA or supervisor) in writing whether the individual is cleared for respirator use, cleared with certain conditions or restrictions (e.g., only for PAPR use, only for limited duration, etc.), or not cleared for respirator use, whether there is a need for a follow-up medical evaluation, or if the individual requires periodic medical reevaluation. The details of any medical evaluation, including specific medical diagnoses or test results, should not be shared with the employer or supervisor.

Your program should include a clear policy as to what will be done if someone is not cleared for respirator use. Employees who are not cleared cannot be exposed to situations in which a respirator is necessary to protect them. If the PLHCP determines that a person designated to use a non-powered air- purifying respirator cannot do so without added health risks the employer must provide a PAPR if the PLHCP determines that the person can use one and the RPA determines that it will provide adequate protection.



Fit Testing

Fit testing is one of the most important parts of the respirator program because it is the only recognized tool to assess the fit of a specific respirator model and size to the face of the user. OSHA requires employers to provide a sufficient number of models and sizes of respirators so that employees can be fit with a respirator that is comfortable and fits well. Employees are only allowed to use the make, model, style, and size of respirator or respirators that they have been successfully fit tested with.

Fit testing is required for all users of respirators with tight-fitting facepieces, including filtering facepiece respirators. The fit test ensures that, when donned properly, the selected brand and size of respirator fits adequately to protect the wearer from excessive inward leakage of contaminant through the face seal. The fit test must be repeated annually and whenever the employee reports or the employer, PLHCP, supervisor, or program administrator makes visual observations of any changes in physical condition, such as weight gain or weight loss, that could alter the fit of the facepiece.

Describe your procedures for coordinating fit testing for your staff, as well as the specific, detailed fit testing protocol that will be used. The OSHA Respiratory Protection Standard Appendix A has specific protocols which must be followed exactly in fit testing employees for respirators, and it is acceptable to copy and paste one or more of these into your RPP. First, there are general requirements that pertain to selecting an appropriately sized respirator, some basic training on donning the respirator and performing a user seal check, and descriptions of the specific exercises that are to be performed during the fit test to verify an adequate seal during several routine work activities. Second, there are detailed protocols for four different qualitative (i.e., wearer indicates fit based on detection of a chemical) fit tests and three quantitative (i.e., provides a numerical test result) fit tests from which you may choose.

Qualitative Tests:

There are four qualitative fit test protocols specified in the respiratory protection standard. Either the saccharin or Bitrex® fit test protocol may be used for fit testing half mask APRs, including filtering facepiece respirators, for particulate exposure. These tests may not be used to determine fit for a respirator with a full facepiece.

In these tests, the user is exposed to a saccharin (sweet-tasting) or Bitrex® (bitter-tasting) aerosol. It is up to the respirator user to let the tester know if he or she tastes the test aerosol at any time. Because these tests rely on the user's subjective detection of leakage when challenged with a test agent, the protocols require pre-screening to determine each user's ability to detect the specific test agent.



Worker receiving qualitative fit testing



Worker receiving quantitative fit testing

Quantitative Tests

There are three approved quantitative fit tests and all require an investment in relatively expensive equipment (currently over \$12,000). The most common quantitative protocol used in hospitals is the ambient aerosol condensation nuclei counter (CNC) test. With the correct equipment, this test protocol can be used for all types of respirators and provides an automated calculation of the effectiveness of fit (fit factor) by consecutively measuring and comparing the concentration of airborne particles inside

It is critical that the person conducting the fit testing follows the protocol written in the respiratory protection standard. Most hospitals do qualitative fit testing using either the saccharin or Bitrex® protocol. There are some, however, who do quantitative fit testing.

It is the program administrator's responsibility to ensure that the person conducting the fit tests is competent. There is no licensing or certification required for someone to do fit testing; anyone can do it as long as they understand how to follow the protocol and are skilled at training people on how to don and doff their respirator and perform a user seal check. In some hospitals, the Employee Health Department or an occupational health clinic is responsible for both medical evaluations and fit testing, and they can be done in one visit.

In other hospitals, the Infection Preventionist is responsible for fit testing the health care workers with filtering facepiece respirators. Still others train each of the unit managers to fit test their own staff so that one person is not charged with fit testing hundreds of employees. Some hospitals do all of their fit testing and training in one month. Others spread it out so that each employee is tested during their anniversary month. You should decide which approaches work best for you and your facility.

Employees can only wear the respirator model and size for which they have successfully passed a fit test. Employers should implement a mechanism to ensure that employees know the manufacturer, model, and size of respirator they can wear. Some hospitals issue wallet-sized cards containing this information, while others place stickers on the back of employee badges.

SUMMARY OF FIT TEST REQUIREMENTS

1. All employees required to wear respirators must be fit tested after receiving medical clearance, prior to respirator use, and annually thereafter.
2. An OSHA-accepted fit test protocol must be followed exactly as it is written in the standard. This may be a qualitative test using Bitrex® or saccharin, a quantitative test using a condensation nuclei counter, or another appropriate instrument.
3. Fit testing must be performed by an individual knowledgeable in respiratory protection, and qualified to follow the protocol and train the employee in the proper donning and doffing of the respirator.
4. Records of fit tests must be kept on file until the next annual test is performed, and you must make sure that employees use only the respirator model and size for which they have passed a fit test.
5. There is no fit test requirement for PAPRs with loose-fitting facepieces, hoods, or helmets. A PAPR with a tight-fitting facepiece requires fit testing (with the blower off)

Fit testing is critical to ensure the safety of the employees relying on their respirators for the expected degree of protection. If hospital personnel do not have the time or skills to conduct fit testing, there are consultants who provide fit testing services. In addition to these consultants, some of the respirator manufacturers will provide train-the-trainer services so you can have multiple in-house staff with these skills. There are also some workers' compensation insurance companies that provide similar assistance to their customers.

Training

Employee training is a critical component of an effective RPP. It requires significant time and resources and must be conducted prior to respirator use, at least annually thereafter, and whenever necessary due to changes in the workplace or identified inadequacies in the employee's knowledge. The annual fit test provides an opportunity for hands-on learning and serves to reinforce some of the topics covered in training. Some hospitals include respirator training as part of a skills day for their health care professionals and require them to pass a competency test.

This section of your written program must include both the mechanism for getting everyone trained in a way that they can understand and a description of the curriculum, including all of the topics that are required by the standard to be covered. These are:

- ✓ Why the respirator is necessary (including when it must be worn);
- ✓ Why proper fit, usage, and maintenance is crucial to its effectiveness;
- ✓ What the limitations and capabilities of the respirator are;
- ✓ How to use the respirator in emergencies if appropriate;
- ✓ Hands-on demonstration of how to inspect, put on, remove, use, and check the seal of the respirator;
- ✓ What the procedures are for storage and maintenance;
- ✓ How to recognize medical signs or symptoms that limit or prevent the safe, effective use of respirators; and
- ✓ The general requirements of the OSHA respiratory protection standard.

There are a number of educational tools (including slide presentations, posters, and flyers) listed in the References, Resources, and Tools section at the end of this document. You may use these materials during your annual training and as needed year-round to make sure that employees are up-to-date on their knowledge of respiratory protection and its proper use. However, you must ensure that respirator users are fully trained on the specific risks, programs, and procedures at your hospital; can correctly don and doff their respirators; and can recognize when their respirator needs to be repaired or replaced.

Recordkeeping

The respirator standard requires that several types of records be maintained. The written RPP must be maintained in a location that is accessible to all program participants, and it must be made available to OSHA on request. We recommend documenting the changes that are made to the RPP along with any evaluation checklists that are completed during program evaluation (see next section). The current program, however, can be kept online for access by participants.

You must also keep a record of the employee medical evaluations. The questionnaires and any notes from physical exams are medically confidential, so these are often maintained by the PLHCP who does the medical clearance evaluations. They must be maintained for 30 years after termination of employment. The

medical clearance letters that are provided by the PLHCP should be kept on file by the RPA as evidence that the employee has been cleared. It makes sense to keep these with the fit test records.

Fit test records must be kept on file until a new fit test is completed, so there should always be a record for each tight-fitting respirator user indicating that they have passed a fit test within the last 12 months. The respirator protection standard requires the following information to be kept in the fit test record:

- Name or employee ID;
- Type of fit test performed;
- Specific make, model, style, and size of respirator tested;
- Date of test; and
- Pass/fail result from qualitative test or printout from quantitative test.

Program Evaluation

Regular program evaluation is required by the standard and critical to successful implementation. There should be a section in your written program that describes how you will evaluate the implementation and effectiveness of your program. The standard does not require this to be done at specific intervals (i.e., annually). It requires that the workplace be evaluated as necessary to ensure that the provisions of the written program are being implemented effectively. It also requires that the employer regularly consult employees to assess their views on the effectiveness of the program.

This means that the RPA, or whoever has been designated to evaluate the program, should observe respirator donning and doffing, availability, storage, maintenance, and other practices in all units where respirators are commonly used. The systems in place to manage respirator use should be evaluated to ensure that they support the behaviors you expect to observe among employees. If someone is not using a respirator when they are supposed to, consider all the possibilities why this may be happening. Some hospitals use a labor-management health and safety committee to tap into the knowledge and experience of employees and obtain feedback and suggestions for improvements, while others survey or interview respirator users.

Any deficiencies in the implementation of policies and procedures that are discovered as a result of evaluation must be corrected in a timely manner. In some cases, this might mean revising the written program to conform to actual practices as long as the procedures being followed comply with the standard. In other cases, it might mean re-training personnel on some aspect of the program, or assigning a loose-fitting PAPR to someone who had been using a filtering facepiece respirator, but has since grown a beard.

OSHA Standards and Guidance

Several OSHA standards and directives are directly applicable to protecting workers against airborne transmission of infectious agents. These include OSHA's

1. Personal Protective Equipment standard (29 CFR 1910.132)
(http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9777) and
2. Respiratory Protection standard (29 CFR 1910.134)
(http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=12716) which provide protection for workers when exposed to droplet and airborne transmissible infectious agents; and
3. OSHA's TB compliance directive
(http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=DIRECTIVES&p_id=1586&p_text_version=FALSE) which protects workers against exposure to TB through enforcement of existing applicable OSHA standards and the General Duty Clause of the OSH Act.

California OSHA Guidance

Cal/OSHA ATD Standard—Diseases/Pathogens Requiring Airborne Infection Isolation (designated in the standard as “airborne infectious diseases” or AirlDs)	
Aerosolizable spore-containing powders such as Anthrax/Bacillus anthracis	Severe acute respiratory syndrome (SARS)
Avian influenza/Avian influenza A (strains capable of causing serious disease in humans)	Smallpox (variola)/Variola virus
Varicella disease (chickenpox, disseminated shingles)	Tuberculosis (TB)/Mycobacterium tuberculosis
Measles (rubeola)/ Measles virus	Novel or unknown pathogens as defined by the standard
Monkeypox/Monkeypox virus	Any other disease for which public health guidelines recommend airborne infection isolation

CAL/OSHA ATD STANDARD – DISEASES/PATHOGENS REQUIRING DROPLET PRECAUTIONS	
Diphtheria pharyngeal	Pneumonia Adenovirus Haemophilus influenzae Serotype b, infants and children Meningococcal Mycoplasma, primary atypical Streptococcus Group A
Epiglottitis, due to Haemophilus influenzae type b	Pneumonic plague/Yersinia pestis
Haemophilus influenzae Serotype b (Hib) disease/Haemophilus influenzae serotype b—Infants and children	Rubella virus infection (German measles)/Rubella virus
Influenza, human (typical seasonal variations)/influenza viruses*	Severe acute respiratory syndrome (SARS)
Meningitis Haemophilus influenzae, type b known or suspected Neisseria meningitidis (meningococcal) known or suspected	Streptococcal disease (group A streptococcus) Skin, wound or burn, Major Pharyngitis in infants and young children Pneumonia Scarlet fever in infants and young children Serious invasive disease
Meningococcal disease sepsis, pneumonia (see also meningitis)	Viral hemorrhagic fevers due to Lassa, Ebola, Marburg, Crimean-Congo fever viruses (airborne infection isolation and respirator use may be required for aerosol-generating procedures)
Mumps (infectious parotitis)/Mumps virus	Mycoplasmal pneumonia
Parvovirus B19 infection (erythema infectiosum)	Pertussis (whooping cough)
Pharyngitis in infants and young children/Adenovirus, Orthomyxoviridae, Epstein-Barr virus, Herpes simplex virus,	Any other disease for which public health guidelines recommend droplet precautions
* Note: Seasonal influenza is the only disease requiring droplet precautions for which Cal/OSHA currently requires respirator use under certain circumstances. See the box on page 18 and the “Stay Informed” discussion starting on page 17.	

Keep in mind that respirator requirements to protect against infectious diseases are based on guidance from the Centers for Disease Control and Prevention (CDC). It is important to stay informed about any changes in public health guidance as new pathogens emerge or relevant new scientific information becomes available. You will then need to consider how your facility's policies and practices may need to change. For example, CDC issued updated guidance on infection control for the 2010-11 seasonal influenza (<http://www.cdc.gov/flu/professionals/infectioncontrol/healthcaresettings.htm>).

CDC recommends that health care workers don a facemask during patient care involving suspected or confirmed influenza, rather than N95 respirators as were used for 2009 H1N1 influenza. Recognizing that the use of a facemask instead of a fit tested N95 respirator may increase the risk of influenza transmission to health care workers, health care facilities are encouraged to continue to include all employees who have direct contact with influenza patients in their respiratory protection program, and to provide fitted respirators to employees who may request to use them in place of facemasks. This is particularly important for employees who may be immunologically compromised or have other reasons to want to minimize their risk of contracting influenza. A respirator policy such as this will both make respirators available to employees who wish to protect themselves against influenza and help to ensure that preparedness is maintained against other infectious disease threats that may arise.

North Carolina Public Health also provides updated information on influenzae (<http://flu.nc.gov/>)

Glossary

Airborne precautions—One of three categories of Transmission-Based Precautions that HICPAC may recommend when Standard Precautions are not sufficient to prevent the transmission of disease. When Airborne Precautions are required HCWs should wear respirators and place patients in airborne infection isolation rooms.

Aerosol-generating procedures—Procedures that may increase potential exposure to aerosol transmissible disease pathogens due to the reasonably anticipated aerosolization of pathogens. Aerosol-generating procedures may also be known as high hazard or cough-inducing procedures. See page 11 for a detailed explanation.

Aerosol transmissible disease (ATD) or aerosol transmissible disease pathogen—Any disease or pathogen requiring Airborne Precautions or Droplet Precautions.

Airborne infection isolation room (AIIR)—A single-occupancy patient-care room designed to isolate persons with suspected or confirmed airborne infectious diseases. Environmental factors are controlled in AIIRs to minimize the transmission of infectious agents that can be spread from person-to-person by the airborne route. AIIRs should maintain negative pressure relative to adjacent rooms and halls (so that air flows under the door gap into the room), an air flow rate of 6–12 air changes per hour, and direct exhaust of air from the room to the outside of the building or recirculation of air through a HEPA filter.

Air-purifying respirator (APR)—A respirator with an air-purifying filter, cartridge, or canister that removes specific air contaminants by passing ambient air through an air-purifying element. See page 14 for a detailed explanation.

Assigned protection factor (APF)—The workplace level of respiratory protection that a respirator or class of respirators is expected to provide to employees when the employer implements a continuing, effective respiratory protection program as specified in 29 CFR 1910.134. The APF is based on the maximum fraction of contaminated air expected to leak into the respirator, not the efficiency of the filter.

Droplet precautions—One of three categories of Transmission-Based Precautions that HICPAC may recommend when Standard Precautions are not sufficient to prevent the transmission of disease. When Droplet Precautions are required HCWs should wear surgical masks and eye protection during patient care, mask the patients during transport, and maintain spatial separation between patients.

Facemask—A loose-fitting, disposable device that creates a physical barrier between the mouth and nose of the wearer and potential contaminants in the immediate environment. Facemasks may be labeled as surgical, laser, isolation, dental, or medical procedure masks. They may come with or without a face shield.

Facepiece—The part of a respirator that covers the nose and mouth of the wearer. Respirators may have half facepieces covering just the nose and mouth, or they may have full facepieces covering the nose, mouth, and eyes. They are designed to form a seal with the face.

Fit factor—A quantitative estimate of the fit of a particular respirator to a specific individual and typically estimates the ratio of the concentration of a substance in ambient air to its concentration inside the respirator when worn.

Fit test—The use of a protocol to qualitatively or quantitatively evaluate the fit of a respirator on an individual.

Food and Drug administration (FDA)—An agency within the U.S. Department of Health and Human Services. The FDA is responsible for, among other things, protecting the public health by assuring drugs, vaccines, and other biological products and medical devices intended for human use are safe and effective.

Filtering facepiece respirator—A type of single-use, negative-pressure, air-purifying respirator where an integral part of the facepiece or the entire facepiece is made of filtering material.

Healthcare Infection Control Practices Advisory Committee (HICPAC)—An advisory committee assembled to provide advice and guidance to the CDC and the U.S. Department of Health and Human Services regarding the practice of infection control and strategies for surveillance, prevention, and control of healthcare-associated infections and antimicrobial resistance in United States healthcare settings. HICPAC authored the 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings, which describes Standard and Transmission-Based Precautions used for infection control.

Health care worker (HCW)—Paid and unpaid persons who provide patient care in a health care setting or any person who provides services that support the delivery of health care such as dietary, housekeeping, engineering, and maintenance personnel.

High-efficiency particulate air (HEpa) filter—A filter that is at least 99.97% efficient in removing particles 0.3 micrometers in diameter. The equivalent NIOSH particulate filters are the N100, R100, P100, and HE filters.

Loose-fitting facepiece—A respiratory inlet covering that leaves the back of the neck exposed and is designed to form a partial seal with the face.

Hood—A respiratory inlet covering that completely covers the head and neck and may also cover portions of the shoulders and torso.

N95 filter—A type of NIOSH-approved filter or filter material, which captures at least 95% of airborne particles and is not resistant to oil.

N95 respirator—A generally used term for a half mask negative-pressure air-purifying respirator with NIOSH-approved N95 filters or filter material or a more efficient filter (i.e., includes N95 filtering facepiece respirator or equivalent protection).

Negative-pressure respirator (tight-fitting)—A respirator in which the pressure inside the facepiece is negative during inhalation with respect to ambient air pressure outside the respirator.

Powered air-purifying respirator (PAPR)—An air-purifying respirator that uses a blower to force air through filters or cartridges and into the breathing zone of the wearer. This creates a positive pressure inside the facepiece or hood, providing more protection than a non-powered or negative-pressure half mask APR.

Personal Protective Equipment (PPE)—Specialized clothing or equipment worn by an employee to protect the respiratory tract, mucous membranes, skin, and clothing from infectious agents or other hazards. PPE includes gloves, respirators, goggles, facemasks, surgical masks, faceshields, and gowns.

Physician or other Licensed Health Care Professional (PLHCP)—An individual whose legally permitted scope of practice (i.e., license, registration, or certification), as defined by the state where he or she practices, allows him or her to independently provide, or be delegated the responsibility to provide, some or all of the health care services required to provide a medical evaluation as described in OSHA's respiratory protection standard.

Qualitative fit testing (QLFT)—A pass/fail fit test to assess the adequacy of respirator fit that relies on the individual's response to the test agent.

Quantitative fit testing (QNFT)—An assessment of the adequacy of respirator fit by numerically measuring the amount of leakage into the respirator.

Respirator—A device worn over the nose and mouth to protect the wearer from hazardous materials in the breathing zone. Respirators must be approved by the National Institute for Occupational Safety and Health (NIOSH) for the purpose for which they are used.

Respiratory protection program (RPP)—Program required by OSHA under the respiratory protection standard that includes development and implementation of detailed policies and worksite-specific procedures for respirator use for control of respiratory hazards.

Respirator program administrator (RPA)—Individual designated to oversee a facility's respiratory protection program (RPP).

Surgical mask—A loose-fitting, disposable device that creates a physical barrier between the mouth and nose of the wearer and potential contaminants in the immediate environment. Surgical masks are fluid resistant and provide protection from splashes, sprays, and splatter.

User seal check—An action conducted by the respirator user to determine if the respirator is properly seated to the face. For all tight-fitting respirators, the employer shall ensure that employees perform a user seal check each time they put on the respirator using the procedures in Appendix B-1 of OSHA's respiratory protection standard or equally effective procedures recommended by the respirator manufacturer. User seal checks are not substitutes for qualitative or quantitative fit tests.

OSHA[®] FactSheet

Respiratory Infection Control: Respirators Versus Surgical Masks

It is important that employers and workers understand the significant differences between these two types of personal protective equipment. The decision whether or not to require workers to use either surgical masks or respirators must be based upon a hazard analysis of the workers' specific work environments and the different protective properties of each type of personal protective equipment.

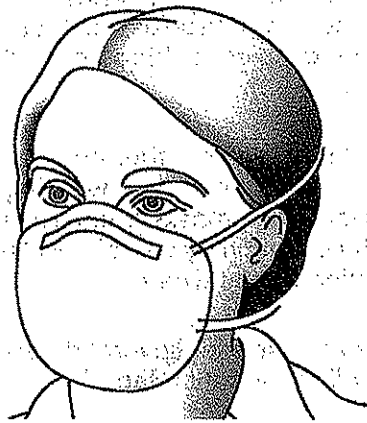
The use of surgical masks or respirators is one practice that may reduce the risk of infectious disease transmission between infected and noninfected persons. Since there is limited historical information on the effectiveness of surgical masks and respirators for the control of influenza during any previous pandemics, the effectiveness of surgical masks and respirators has been inferred on the basis of the mode of influenza transmission, particle size and professional judgment.

To offer protection, both surgical masks and respirators need to be worn correctly and consistently. If used properly, surgical masks and respirators both have a role in preventing different types of exposures. During an influenza pandemic, surgical masks and respirators need to be used in conjunction with interventions that are known to prevent the spread of infection, such as engineering and administrative controls (e.g., installing sneeze guards, teleworking) and work practices (e.g., cough etiquette, hand hygiene, and avoiding large gatherings).

Respirators

Respirators are designed to reduce a worker's exposure to airborne contaminants. Respirators come in various sizes and must be individually selected to fit the wearer's face and to provide a tight seal. A proper seal between the user's face and the respirator forces inhaled air to be pulled through the respirator's filter material and not through gaps between the face and respirator.

Respirators offer the best protection for workers who must work closely (either in contact with or within 6 feet) with people



who have influenza-like symptoms. These generally include those workers who work in occupations classified as *very high exposure risk* or *high exposure risk* to pandemic influenza. For additional information on very high and high exposure risk occupations, please refer to OSHA Publication No. 3327, entitled *Guidance on Preparing Workplaces for an Influenza Pandemic*, which can be found at <http://www.osha.gov/dsg/topics/pandemicflu/index.html>.

Where workers are required by employers to wear respirators, they must be NIOSH-certified, selected, and used in the context of a comprehensive respiratory protection program, (see OSHA standard 29 CFR 1910.134, or www.osha.gov/SLTC/respiratoryprotection/index.html). It is important to medically evaluate workers to ensure that they can perform work tasks while wearing a respirator. For many workers, medical evaluation may be accomplished by having a physician or other licensed healthcare provider review a

respiratory questionnaire completed by the worker (found in Appendix C of OSHA's Respiratory Protection standard, 29 CFR 1910.134) to determine if the worker can be medically cleared to use a respirator. Employers who have never before needed to consider a respiratory protection plan should note that it can take time to choose an appropriate respirator to provide to workers; arrange for a qualified trainer; and provide training, fit testing and medical evaluation for their workers. If employers wait until an influenza pandemic occurs, they may be unable to implement an adequate respiratory protection program in a timely manner.

Surgical Masks

Surgical masks are used as a physical barrier to protect the user from hazards, such as splashes of large droplets of blood or body fluids.

Surgical masks also protect other people against infection from the person wearing the surgical mask. Such masks trap large particles of body fluids that may contain bacteria or viruses expelled by the wearer.

Surgical masks are used for several different purposes, including the following:

- Placed on sick people to limit the spread of infectious respiratory secretions to others.

- Worn by healthcare providers to prevent accidental contamination of patients' wounds by the organisms normally present in mucus and saliva.
- Worn by workers to protect themselves from splashes or sprays of blood or bodily fluids; they may also keep contaminated fingers/hands away from the mouth and nose.

Surgical masks are not designed or certified to prevent the inhalation of small airborne contaminants. These particles are not visible to the naked eye but may still be capable of causing infection. Surgical masks are not designed to seal tightly against the user's face. During inhalation, much of the potentially contaminated air can pass through gaps between the face and the surgical mask and not be pulled through the filter material of the mask. Their ability to filter small particles varies significantly based upon the type of material used to make the surgical mask, so they cannot be relied upon to protect workers against airborne infectious agents. Only surgical masks that are cleared by the U.S. Food and Drug Administration to be legally marketed in the United States have been tested for their ability to resist blood and body fluids.

This is one in a series of informational fact sheets highlighting OSHA programs, policies or standards. It does not impose any new compliance requirements. For a comprehensive list of compliance requirements of OSHA standards or regulations, refer to Title 29 of the Code of Federal Regulations. This information will be made available to sensory impaired individuals upon request. The voice phone is (202) 693-1999; teletypewriter (TTY) number: (877) 889-5627.

For more complete information:



U.S. Department of Labor

www.osha.gov

(800) 321-OSHA

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INTEGRATION OF RESPIRATORY PROTECTION INTO PRACTICE AMONG HEALTH CARE WORKERS

May 30, 2013

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May 30 2013

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Appendices

1. Respiratory Protection Evaluation Checklist Tool
2. Template : Respiratory Protection Program for Health Care Facility
3. Respiratory Protection Program Checklist from TB Guidelines

Web Resources

1. CDC Infection Control in Health Care Settings:
<http://www.cdc.gov/flu/professionals/infectioncontrol/healthcaresettings.htm>
2. TB Respiratory Protection Program In Health Care Facilities- Administrator's Guide:
<http://www.cdc.gov/niosh/docs/99-143/pdfs/99-143.pdf>
3. Small Entity Compliance Guide for the Respiratory Protection Standard:
<http://www.osha.gov/Publications/3384small-entity-for-respiratory-protection-standard-rev.pdf>
4. NC-OSHA Industry Guide 44 "A Guide to Respiratory Protection"
<http://www.nclabor.com/osha/etta/indguide/ig44.pdf>
5. Interim Guidance for the Use of Masks to Control Influenza Transmission
<http://www.cdc.gov/flu/professionals/infectioncontrol/maskguidance.htm>
6. 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings
<http://www.cdc.gov/hicpac/2007IP/2007isolationPrecautions.html>
7. Facemasks and Respirators –
<http://www.cdph.ca.gov/programs/ohb/documents/HCResp-MaskRespFlyer.pdf>
8. OSHA Respiratory Protection Booklet: Publication # 3079:
www.osha.gov/Publications/osha3079.pdf
9. Federal OSHA Respiratory Protection Topic Page
<http://www.osha.gov/SLTC/respiratoryprotection/index.html>
10. Major Requirements of OSHA's Respiratory Protection Standard 29CFR1910.134
https://www.dir.ca.gov/dosh/etools/08-012/08-01201_Respirators/Major%20Requirements%20of%20OSHA's%20Respiratory%20Protection%20Standard.pdf
11. Link to NC Flu Update: NC DHHS <http://www.flu.nc.gov/providers/>
12. Link to Respirator Fit Testing Training Card
<http://www.cdph.ca.gov/programs/ohb/documents/HCResp-FitTestTrainingCard.pdf>
13. NC DHHS Respiratory Protection Program Policies
http://info.dhhs.state.nc.us/olm/manuals/dhs/pol-50/man/Pol5_SB_Respiratory_Protect1.htm
14. NIOSH National Personal Protective Technology Laboratory www.cdc.gov/niosh/npptl
15. NIOSH Respirator Topic Page: www.cdc.gov/niosh/topics/respirators/
16. NIOSH Respirator Topic Page – Respirators:
<http://www.cdc.gov/niosh/topics/respirators/>
17. NIOSH Respirator Trusted Source Page
www.cdc.gov/niosh/npptl/topics/respirators/disp_part/RespSource.html
18. Federal OSHA Respiratory Protection Topic Page
www.osha.gov/SLTC/respiratoryprotection/index.html
19. OSHA: A Respirators vs Surgical Masks - Two-page Fact Sheet
<http://www.osha.gov/Publications/respirators-vs-surgicalmasks-factsheet.pdf>
20. CDC: Interim Guidance for the Use of Masks to Control Influenza Transmission -
<http://www.cdc.gov/flu/professionals/infectioncontrol/maskguidance.htm#>

RESOURCES FOR TRAINING FOR RESPIRATORY PROGRAM ADMINISTRATORS

1. North Carolina Occupational Safety and Health Education and Research Center
<http://osherc.sph.unc.edu/index.html>
2. North Carolina Department of Labor
[http://www.nclabor.com/osha/etta/A to Z Topics/Respiratory%20Protection.htm](http://www.nclabor.com/osha/etta/A%20to%20Z%20Topics/Respiratory%20Protection.htm)
3. OSHA Respiratory Protection Training Requirements
http://www.osha.gov/video/respiratory_protection/training_transcript.html

Videos

1. OSHA: Respiratory Protection eTool: <http://www.osha.gov/SLTC/etools/respiratory/>
2. OSHA: January 12, 2011: Respiratory Protection for Healthcare Workers Training Video:
<http://www.dol.gov/dol/media/webcast/20110112-respirators/>
3. NIOSH: Difference Between Respirators and Surgical Masks Video:
http://www.cdc.gov/niosh/npptl/topics/respirators/disp_part/DifferenceRespSurgical.html
4. NIOSH: Donning and Doffing and User Seal Checks Video:
http://www.cdc.gov/niosh/npptl/topics/respirators/disp_part/DonningDoffing.html
5. OSHA: Respirator Types Video:
https://www.osha.gov/video/respiratory_protection/resptypes.html
6. OSHA: Respirator Fit Testing Video:
https://www.osha.gov/video/respiratory_protection/fittesting.html
7. OSHA: Maintenance and Care of Respirators Video:
https://www.osha.gov/video/respiratory_protection/maintenance.html
8. OSHA: Medical Evaluation for Workers Who Use Respirators:
https://www.osha.gov/video/respiratory_protection/medevaluations.html
9. OSHA: Respiratory Protection Training Requirements:
https://www.osha.gov/video/respiratory_protection/training.html
4. OSHA: Differences between facemasks and respirators
English: <http://www.osha.gov/video/20091216-respirator-1-english-high.wmv> and Spanish:
<http://www.osha.gov/video/20091216-respirator-1-spanish-high.wmv>

PUBLIC HEALTH NURSING AND PROFESSIONAL DEVELOPMENT (PHNPDU)

Activity Title: INTEGRATION OF RESPIRATORY PROTECTION INTO PRACTICE AMONG HEALTH CARE

WORKERS

Date: 5/30/2013

Location: Friday Center, Chapel Hill, NC

Activity #: _____

Continuing Education Disclosures

Participants must attend the entire session in order to earn contact hour credit. Verification of participation will be noted by signature on the roster or being "checked off" on a computer print out of participants. No influential financial relationships have been disclosed by planners or presenters which would influence the planning of this activity. If any arise, an announcement will be made at the beginning of the session. No commercial support has influenced the planning of the educational objectives and content of this event. Any commercial support will be used for events that are not CE related. There is no endorsement of any product by NCNA or ANCC associated with this session. No session relates to products governed by the Food and Drug Administration. If it did, appropriate and off-label use will be shared.

I Please rate the effectiveness of this continuing nursing education activity.

Objectives Achieved	Excellent	Good	Fair	Poor
Objective 1 Identify the purpose of the Respiratory Protection Conference				
Objective 2 List the components of Respiratory Protection Program in the Health Care				
Objective 3 Describe the status of the Respiratory Protection use in NC hospitals				
Objective 4 Describe the procedure of Respirator Fit Testing				
Objective 5 Demonstrate correct method of donning and doffing Respirators				
Objective 6 Describe the components of the Joint Commission Tool Kit for Use of Respiratory Protection in Health Care				
Objective 7 Identify strategies for Implementing Respiratory Protection Programs at Health Care Institutions				
Objective 8 Describe the process for conducting focus group meeting				
Objective 9 Identify the role and responsibility of the "practice champion"				

(Note- Add, delete, expand row(s) as needed for the activity's # and length of objectives.)

II. Please rate the audiovisuals/handouts used for this workshop.

Excellent		Good		Fair		Poor	

III. Please evaluate the expertise of each presenter individually.

Presenter(s) Add rows if needed for more presenter(s) names.	Excellent	Good	Fair	Poor
Bonnie Rogers				
Edie Alfano-Sobsey				
John "Pat" Curran				
Kathleen Buckheit				
Debbie Novak				
Judy Ostendorf				

IV. Please evaluate the physical environment where the workshop was held:

Excellent		Good		Fair		Poor	

V. How do you plan to use this information in your practice setting?

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**MAJOR REQUIREMENTS OF OSHA'S
RESPIRATORY PROTECTION STANDARD
29 CFR 1910.134**

OSHA Office of Training and Education
March 1998

This document discusses the major requirements of OSHA's Respiratory Protection Standard, 29 CFR 1910.134.

No attempt has been made to discuss every detail of the standard. Readers are encouraged to consult the *Federal Register* (63 FR 1152, January 8, 1998) for the complete text. The corresponding page numbers of major paragraphs as they appear in Section VII (Summary and Explanation of the Standard) are provided throughout this document to facilitate further reading.

MAJOR REQUIREMENTS OF 29 CFR 1910.134

Introduction

- This standard, which replaces the respiratory protection standards adopted by OSHA in 1971 (29 CFR 1910.134 and 29 CFR 1926.103), applies to General Industry (Part 1910), Shipyards (Part 1915), Marine Terminals (Part 1917), Longshoring (Part 1918), and Construction (Part 1926).
- Respirator-related provisions of OSHA's existing standards are revised to conform to each other and to revised 29 CFR 1910.134.
- All provisions addressing respirator use, selection, and fit testing are deleted from OSHA's substance-specific standards.
- The entire previous respirator standard, 29 CFR 1910.134, is redesignated as 29 CFR 1910.139 *Respirator protection for M. tuberculosis*, and will continue to apply to respirator use for protection against exposure to TB until the TB standard is finalized (proposal 62 FR 54160, Oct. 17, 1997).

(a) Permissible Practice (p. 1179)

- Paragraphs (a)(1) and (a)(2) are essentially unchanged from the corresponding paragraphs of the prior standard. Paragraph (a)(1) establishes the hierarchy of controls by requiring the use of respirators when "effective engineering controls are not feasible, or while they are being instituted."
- Paragraph (a)(2) requires employers to provide employees with respirators that are "applicable and suitable" for the purpose intended "when such equipment is necessary to protect the health of the employee."

(b) Definitions (p. 1181)

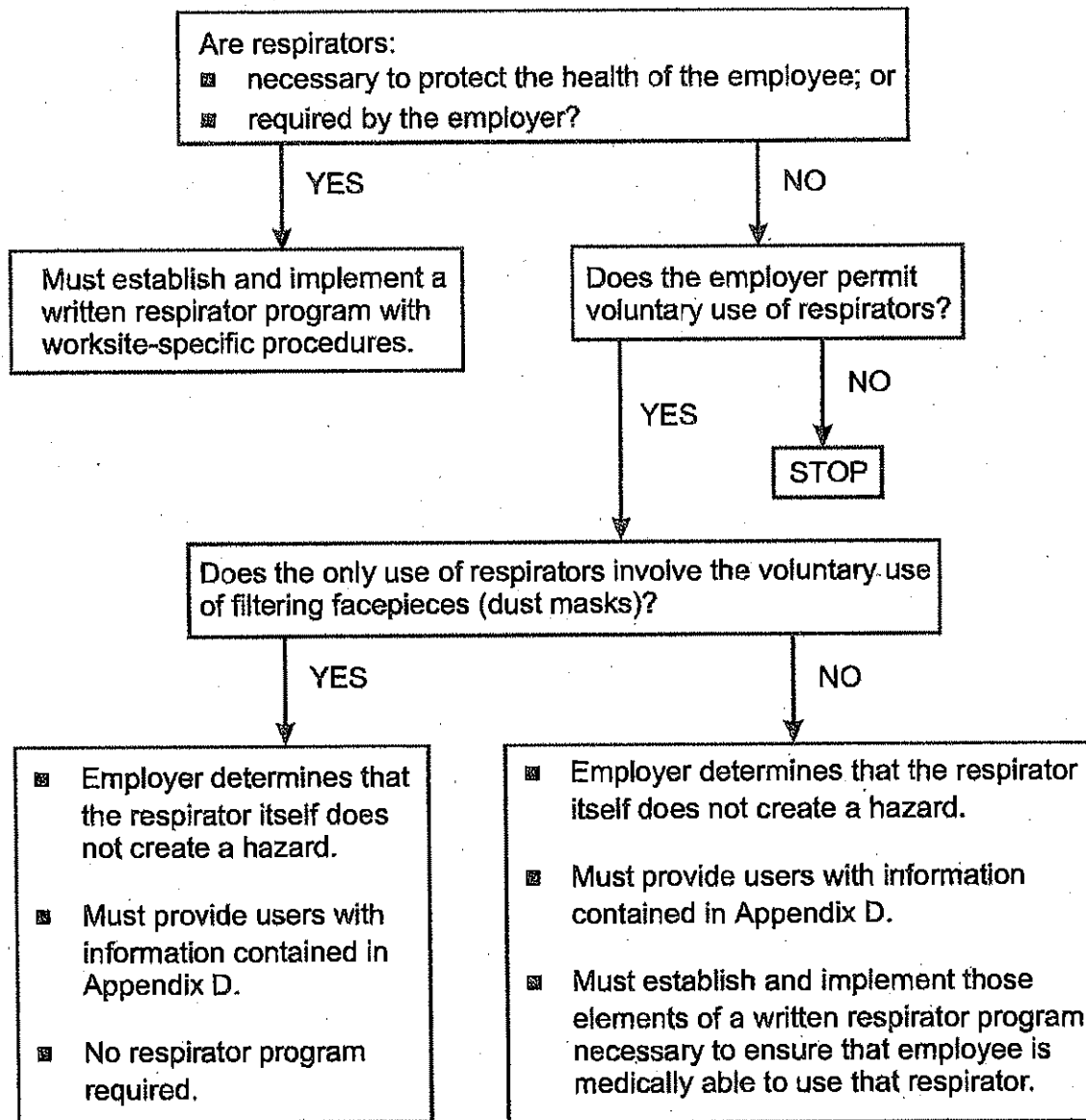
This paragraph contains definitions of important terms used in the regulatory text. The previous respiratory protection standard contained no definitions.

(c) Respiratory Protection Program (p. 1187)

- Must designate a qualified program administrator to oversee the program.
- Must provide respirators, training, and medical evaluations at no cost to the employee.
- OSHA has prepared a *Small Entity Compliance Guide* that contains criteria for selection of a program administrator and a sample program.

Respirator-Use Requirements Flow Chart

29 CFR 1910.134(c)



(d) Selection of Respirators (p. 1195)

- Must select a respirator certified by the National Institute for Occupational Safety and Health (NIOSH) which must be used in compliance with the conditions of its certification.
- Must identify and evaluate the respiratory hazards in the workplace, including a reasonable estimate of employee exposures and identification of the contaminant's chemical state and physical form.
- Where exposure cannot be identified or reasonably estimated, the atmosphere shall be considered immediately dangerous to life or health (IDLH).
- Respirators for IDLH atmospheres:
 - ▶ Approved respirators:
 - full facepiece pressure demand self-contained breathing apparatus (SCBA) certified by NIOSH for a minimum service life of thirty minutes, or
 - combination full facepiece pressure demand supplied-air respirator (SAR) with auxiliary self-contained air supply.
 - ▶ All oxygen-deficient atmospheres (less than 19.5% O₂ by volume) shall be considered IDLH.
Exception: If the employer can demonstrate that, under all foreseeable conditions, oxygen levels in the work area can be maintained within the ranges specified in Table II (i.e., between 19.5% and a lower value that corresponds to an altitude-adjusted oxygen partial pressure equivalent to 16% oxygen at sea level), then *any* atmosphere-supplying respirator may be used.
- Respirators for non-IDLH atmospheres:
 - ▶ For protection against gases and vapors, the employer shall provide:
 - an atmosphere-supplying respirator, or
 - an air-purifying respirator, provided that:
 - respirator is equipped with an end-of-service-life indicator (ESLI) certified by NIOSH for the contaminant; or
 - if there is no ESLI appropriate for conditions of the employer's workplace, the employer implements a change schedule for canisters and cartridges that will ensure that they are changed before the end of their service life and describes in the respirator program the information and data relied upon and basis for the change schedule and reliance on the data.
 - ▶ For protection against particulates, the employer shall provide:
 - atmosphere-supplying respirator; or
 - an air-purifying respirator equipped with high efficiency particulate air (HEPA) filters certified by NIOSH under 30 CFR Part 11 or with filters certified for particulates under 42 CFR Part 84; or
 - an air-purifying respirator equipped with any filter certified for particulates by NIOSH for contaminants consisting primarily of particles with mass median aerodynamic diameters of at least 2 micrometers.

(e) Medical Evaluation (p. 1207)

- Must provide a medical evaluation to determine employee's ability to use a respirator, before fit testing and use.
- Must identify a physician or other licensed health care professional (PLHCP) to perform medical evaluations using a medical questionnaire or an initial medical examination that obtains the same information as the medical questionnaire (information required is contained in mandatory Appendix C).
- Must obtain a written recommendation regarding the employee's ability to use the respirator from the PLHCP.
- Additional medical evaluations are required under certain circumstances, e.g.:
 - employee reports medical signs or symptoms related to ability to use respirator;
 - PLHCP, program administrator, or supervisor recommends reevaluation;
 - information from the respirator program, including observations made during fit testing and program evaluation, indicates a need; or
 - change occurs in workplace conditions that may substantially increase the physiological burden on an employee.
- Annual review of medical status is not required.

(f) Fit Testing (p. 1221)

- All employees using a negative or positive pressure tight-fitting facepiece respirator must pass an appropriate qualitative fit test (QLFT) or quantitative fit test (QNFT).
- Fit testing is required prior to initial use, whenever a different respirator facepiece is used, and at least annually thereafter. An additional fit test is required whenever the employee reports, or the employer or PLHCP makes visual observations of, changes in the employee's physical condition that could affect respirator fit (e.g., facial scarring, dental changes, cosmetic surgery, or an obvious change in body weight).
- The fit test shall be administered using an OSHA-accepted QLFT or QNFT protocol, as contained in mandatory Appendix A.
 - QLFT Protocols:
 - Isoamyl acetate
 - Saccharin
 - Bitrex
 - Irritant smoke
 - QNFT Protocols:
 - Generated Aerosol (corn oil, salt, DEHP)
 - Condensation Nuclei Counter (PortaCount)
 - Controlled Negative Pressure (Dynatech FitTester 3000)
- QLFT may only be used to fit test negative pressure air-purifying respirators (APRs) that must achieve a fit factor of 100 or less.

- If the fit factor determined through QNFT is ≥ 100 for tight-fitting half facepieces, or ≥ 500 for tight-fitting full facepieces, the QNFT has been passed with that respirator.

Note: If a particular OSHA standard (e.g., 29 CFR 1910.1001 Asbestos) requires the use of a full facepiece APR capable of providing protection in concentrations up to 50 times the Permissible Exposure Limit (PEL), this respirator must be QNFT. This is because a protection factor of 50 (50 X PEL) multiplied by a standard safety factor of 10 is equivalent to a fit factor of 500.

The safety factor of 10 is used because protection factors in the workplace tend to be much lower than the fit factors achieved during fit testing. The use of a safety factor is a standard practice supported by most experts to offset this limitation. This is discussed in the record at 63 FR 1225.

(g) Use of Respirators (p. 1236)

- Tight-fitting respirators shall not be worn by employees who have facial hair or any condition that interferes with the face-to-facepiece seal or valve function.
- Personal protective equipment shall be worn in such a manner that does not interfere with the seal of the facepiece to the face of the user.
- Employees shall perform a user seal check each time they put on a tight-fitting respirator using the procedures in mandatory Appendix B-1 or equally effective manufacturer's procedures.
- Procedures for respirator use in IDLH atmospheres are stated. In addition to these requirements, interior structural firefighting requires the use of SCBAs and a protective practice known as "2-in/2-out" — at least two employees must enter and remain in visual or voice contact with one another at all times, and at least two employees must be located outside. (Note that this is not meant to preclude firefighters from performing emergency rescue activities before an entire team has assembled.)

(h) Maintenance and Care of Respirators (p. 1248)

Must clean and disinfect respirators using the procedures in Appendix B-2, or equally effective manufacturer's procedures at the following intervals:

- as often as necessary to maintain a sanitary condition for exclusive use respirators,
- before being worn by different individuals when issued to more than one employee, and
- after each use for emergency use respirators and those used in fit testing and training.

(i) Breathing Air Quality and Use (p. 1252)

Compressed breathing air shall meet the requirements for Type 1-Grade D breathing air as described in ANSI/CGA *Commodity Specification for Air*, G-7.1-1989.

(j) Identification of Filters, Cartridges, and Canisters (p. 1257)

- All filters, cartridges, and canisters used in the workplace must be labeled and color coded with the NIOSH approval label.
- The label must not be removed and must remain legible.

(k) Training and Information (p. 1258)

- Must provide effective training to respirator users, including:
 - ▶ why the respirator is necessary and how improper fit, use, or maintenance can compromise the protective effect of the respirator
 - ▶ limitations and capabilities of the respirator
 - ▶ use in emergency situations
 - ▶ how to inspect, put on and remove, use and check the seals
 - ▶ procedures for maintenance and storage
 - ▶ recognition of medical signs and symptoms that may limit or prevent effective use
 - ▶ general requirements of this standard
- Training required prior to initial use, unless acceptable training has been provided by another employer within the past 12 months.
- Retraining required annually and when:
 - ▶ workplace conditions change,
 - ▶ new types of respirator are used, or
 - ▶ inadequacies in the employee's knowledge or use indicates need.
- The basic advisory information in Appendix D shall be provided to employees who wear respirators when their use is not required.

(l) Program Evaluation (p. 1262)

Employer must conduct evaluations of the workplace as necessary to ensure proper implementation of the program, and consult with employees to ensure proper use.

(m) Recordkeeping (p. 1264)

- ☒ Records of medical evaluations must be retained and made available per 29 CFR 1910.1020.
- ☒ A record of fit tests must be established and retained until the next fit test.
- ☒ A written copy of the current program must be retained.

(n) Dates (p. 1264)

- ☒ Determination that respirator use is required [paragraph (a)] shall be completed no later than 9/8/98.
- ☒ Compliance with all other provisions of this standard shall be completed no later than 10/5/98.

Respiratory Protection Program Checklist

From

TB Respiratory Protection Program in Health Care Facilities Administrator's Guide

<http://www.cdc.gov/niosh/docs/99-143/pdfs/99-143.pdf>

In general, the respiratory protection program should be evaluated for each job or at least annually, with program adjustments, as appropriate, made to reflect the evaluation results. Program function can be separated into administration and operation.

A. Program Administration

- _____ (1) Is there a written policy which acknowledges employer responsibility for providing a safe and healthful workplace, and assigns program responsibility, accountability, and authority?
- _____ (2) Is program responsibility vested in one individual who is knowledgeable and who can coordinate all aspects of the program at the health care facility?
- _____ (3) Can administrative and engineering controls eliminate the need for respirators?
- _____ (4) Are there written procedures/statements covering the various aspects of the respirator program, including:
 - _____ (a) designation of an administrator;
 - _____ (b) respirator selection;
 - _____ (c) purchase of NIOSH certified respirators;
 - _____ (d) medical aspects of respirator usage;
 - _____ (e) issuance of equipment;
 - _____ (f) fitting; (g) training;
 - _____ (h) maintenance, storage, and repair;
 - _____ (i) inspection;
 - _____ (j) use under special conditions; and
 - _____ (k) work area surveillance?

B. Program Operation

- _____ (1) Respiratory protective equipment selection
 - _____ (a) Are work area conditions and worker exposures properly surveyed?
 - _____ (b) Are respirators selected on the basis of the hazard to which the worker is exposed?
 - _____ (c) Are selections made by individuals knowledgeable in proper selection procedures?
- _____ (2) Are only NIOSH certified respirators purchased and used; do they provide adequate protection for the specific hazard?
- _____ (3) Has a medical evaluation of the prospective user been made to determine physical and psychological ability to wear the selected respiratory protective equipment?

- _____ (4) Where practical, have respirators been issued to the users for their exclusive use, and are there records covering issuance?
- _____ (5) Respiratory protective equipment fitting
- _____ (a) Are the users given the opportunity to try on several respirators to determine whether the respirator they will be subsequently wearing is the best fitting one?
- _____ (b) Is the fit tested at appropriate intervals?
- _____ (c) Are those users who require corrective lenses properly fitted?
- _____ (d) Is the facepiece-to-faceseal tested in a test atmosphere?
- _____ (e) Are workers prohibited from wearing respirators in contaminated work areas when they have facial hair or other characteristics which may cause faceseal leakage?
- _____ (6) Respirator use in the work area
- _____ (a) Are respirators being worn correctly (i.e., head covering over respirator straps)?
- _____ (b) Are workers keeping respirators on all the time while in the designated areas?
- _____ (7) Maintenance of respiratory protective equipment

Cleaning and Disinfecting

- _____ (a) Are nondisposable respirators cleaned and disinfected after each use when different people use the same device, or as frequently as necessary for devices issued to individual users?
- _____ (b) Are proper methods of cleaning and disinfecting utilized?

Storage

- _____ (a) Are respirators stored in a manner so as to protect them from dust, sunlight, heat, damaging chemicals, or excessive cold or moisture?
- _____ (b) Are respirators stored in a storage facility so as to prevent them from deforming?
- _____ (c) Is storage in lockers permitted only if the respirator is in a carrying case or carton?

Inspection

- _____ (a) Are respirators inspected before and after each use and during cleaning?
- _____ (b) Are qualified individuals/users instructed in inspection techniques?
- _____ (c) Are records kept of the inspection of respiratory protective equipment?

Repair

- _____ (a) Are replacement parts used in repair those of the manufacturer of the respirator?
- _____ (b) Are repairs made by trained individuals?

_____ (8) Training and Feedback

- _____ (a) Are users trained in proper respirator use, cleaning, and inspection?
- _____ (b) Are users trained in the basis for selection of respirators?
- _____ (c) Are users evaluated, using competency-based evaluation, before and after training?
- _____ (d) Are users periodically consulted about program issues (e.g., discomfort, fatigue, etc.)?



A Guide to Respiratory Protection



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This guide is intended to be consistent with all existing OSHA standards; therefore, if an area is considered by the reader to be inconsistent with a standard, then the OSHA standard must be followed instead of this guide. Additional information about respirators and respiratory protection programs can be accessed through the A-Z Safety and Health Topics on the N.C. Department of Labor's Internet site.

To obtain additional copies of this guide, or if you have questions about North Carolina occupational safety and health standards or rules, please contact:

N.C. Department of Labor
Education, Training and Technical Assistance Bureau
1101 Mail Service Center
Raleigh, NC 27699-1101

Phone: 919-807-2875 or 1-800-625-2267

Additional sources of information are listed on the inside back cover of this guide.

The projected cost of the NCDOL OSH program for federal fiscal year 2011-2012 is \$17,841,216. Federal funding provides approximately 31 percent (\$5,501,500) of this total.

Revised 1/12



Contents

Part	Page
Foreword	v
Introduction	vi
1 Respiratory Hazards in the Workplace	1
2 Types of Respirators	3
3 Elements of a Respiratory Protection Program	9
4 Respirator Selection	10
5 Medical Evaluation	13
6 Fit Testing	15
7 Use of Respirators	17
8 Maintenance and Care of Respirators	20
9 Breathing Air Quality and Use	22
10 Employee Training and Information	24
11 Program Evaluation	25
12 Recordkeeping	26
13 Biological Hazards	27
14 Standards Having Specific Respirator Selection Requirements and Prohibitions	28
15 Glossary	29
16 References	31
Appendix I—Respirator Cleaning Procedures	32
Appendix II—Medical Questionnaires	33
Appendix C	34
Apéndice C: Cuestionario de Evaluación Médico	39
Appendix III—Required Information for Voluntary Use	44
Appendix D: Information for Employees Using Respirators When Not Required Under the Standard	45
Apéndice D: Información para Trabajadores que Usan Respiradores Voluntariamente (Obligatorio)	46
Appendix IV—Sample Respiratory Protection Programs and Other Information	47

Foreword

The term respirator invokes several images. One of these is that of a single strap dust mask similar to those sold in almost any hardware or home improvement store. Another is that of the gas masks worn by military personnel during combat or anti-terrorist activities. Lastly, the term respirator may conjure up the image of a fire fighter wearing a self-contained breathing apparatus (SCBA) rushing into a burning building. Regardless of the type of respirator worn, if it is not properly used it can have detrimental health effects for the user. These health effects can range from slight irritation of the throat and lungs to illness or, in the worst case, death.

A Guide to Respiratory Protection examines the types of respirators available and the elements of an effective respiratory protection standard that are required by the NCDOL OSHA respiratory protection standard, 29 CFR 1910.134. Particular attention is given to selection, medical evaluation, fit testing and training.

In North Carolina, the N.C. Department of Labor enforces the federal Occupational Safety and Health Act through a state plan approved by the U.S. Department of Labor. NCDOL offers many educational programs to the public and produces publications to help inform people about their rights and responsibilities regarding occupational safety and health.

When reading this guide, please remember the mission of the N.C. Department of Labor is greater than just regulatory enforcement. An equally important goal is to help citizens find ways to create safe workplaces. Everyone profits when managers and employees work together for safety. This booklet, like the other educational materials produced by the N.C. Department of Labor, can help.

Cherie Berry
Commissioner of Labor

Introduction

In industry, respirators are often viewed as a quick fix for protecting employees against overexposures to airborne contaminants when existing ventilation is inadequate. However, there are limitations on the use of respirators that, if exceeded, can subject employees to serious or fatal health consequences.

Respirators have been used throughout history as early as ancient Roman times. Mention of their use appears in reports of industrial processes during the Middle Ages.¹ Early respirators consisted of animal bladders and animal blankets or rags wrapped around the nose and mouth. With the 19th century came the development of masks, primarily for fire fighters, that combined aerosol filters and vapor absorbents.

The use of chemical warfare agents in World War I led to the development of respirators by the Bureau of Mines for use by the army. Following the war, the need to protect individuals against the misuse of wartime respirators led to the development of the first United States respirator standards by the Bureau of Mines that governed the approval and use of respirators. Subsequently, the first respirator approval was issued in 1920 for a self-contained breathing apparatus (SCBA). Following this, other federal respiratory protection standards were developed, leading to the present OSHA respiratory protection standard, 29 CFR 1910.134, and to the current certification and approval of respirators by the National Institute for Occupational Safety and Health (NIOSH). These rules were initially promulgated under 30 CFR Part 11 and were later recodified to 42 CFR Part 84.

1. *Patty's Industrial Hygiene and Toxicology*, 4th Edition, John Wiley & Sons, Inc., 1991, pp 675-676 and references therein.

Respiratory Hazards in the Workplace

Exposure Assessment

Respiratory protection should never be used either as a primary solution or as the only solution for controlling employee exposure to harmful airborne contaminants. Rather, respirators supplement engineering and administrative controls and work practices when they are not adequate to control worker exposure to airborne contaminants to safe levels.

To identify the appropriate type and level of respiratory protection, employers must conduct an exposure assessment of their workplace. The purpose of this is to identify the types of air contaminants present and the levels of exposure to these substances to select the appropriate respirator when respiratory protection is necessary.

Air contaminants can exist in several forms that are dependent on their identity, how the exposure is generated, and its physical form or state of matter. These include particulates, gases and vapors.

Particulates

Particulates constitute the most common type of air contaminant in occupational settings and include dusts, fibers, mists and fumes. Dusts are generated during the handling, crushing, grinding, detonation, impact and decrepitation (breaking apart by heat) of solid materials and have a general range of particle sizes ranging from 0.1 to 25 micron (1/25,400 inch) diameter. The health consequences of dust exposure by inhalation depend on the dust particle size and the toxicity of the material from which the dust is generated. Some dusts that are known to produce hazardous health effects include those from beryllium, raw cotton, inorganic lead, nickel, cadmium, chromium and silica.

A fiber is a particle that has a length-to-diameter ratio of 3 to 1 or greater. In the workplace, exposure to fibers can arise from asbestos-containing materials and man-made mineral fibers (MMMF, also referred to as synthetic vitreous fibers (SVF)) such as refractory ceramic fibers, fiberglass (glass wool and glass filament) and mineral wool (rockwool and slagwool).²

A fume is formed when volatilized particles condense in air during operations such as welding, brazing and torch cutting. Fume particulates generally have a particle diameter that is less than 1 micron. In most cases, the hot vapor reacts with oxygen in air to form the oxide. Examples include iron oxide fume, zinc oxide fume and chromium (VI) oxide.

Mists are suspended liquid droplets generated by the condensation of liquids from vapor back to liquid or by breaking up liquid into a dispersed state, for example, by atomization or splashing. Mists are often found in electroplating and pickling operations.

The size of the particulate determines what part of the respiratory system will be affected. Particles that have a diameter of 10 microns or greater will be deposited in the upper regions of the lungs and will not impact the alveolar (gas exchange) region of the lungs. These are referred to as non-respirable particles. Particulates that are less than 10 microns in diameter are small enough to reach the alveolar sacs of the lungs in great quantities.

With the exception of fibers, the concentration of particulates in air is expressed in terms of milligrams per cubic meter (mg/m³). The measured concentration of airborne fibers, especially for asbestos fibers, is expressed in fibers per cubic centimeter (f/cc).

Gases and Vapors

Vapors are normally in a liquid state at normal temperature and pressure. Vapors can be returned to the liquid state either by lowering the temperature or by increasing the pressure.

². National Institute for Occupational Safety and Health (NIOSH), *Criteria for a Recommended Standard: Occupational Exposure to Refractory Ceramic Fibers*. DHHS (NIOSH) Publication 2006-123, 2006.

At room temperature and normal pressure, a gas expands to assume the shape and size of the container it occupies. Unlike vapors, gases can be compressed. Additionally they can be returned to a liquid state by lowering the temperature and increasing the pressure.

Gases and vapors, which are measured in units of parts per million (ppm), exert their effects in the alveolar region of the lungs through irritation of surrounding tissue and by absorption directly into the bloodstream. Sampling for gases and vapors in the work environment is done to determine oxygen content, the presence and concentrations of toxic gases, and to identify whether explosive levels of gases exist. For purposes of respiratory protection, only the first two are relative to the use of respirators.

Immediately Dangerous to Life and Health (IDLH)

Special consideration must be given to atmospheric levels of oxygen or toxic substances that are immediately dangerous to life and health (IDLH). The OSHA Respiratory Protection Standard, 29 CFR 1910.134, defines "immediately dangerous to life and health" as an atmosphere that poses an immediate threat to life, would cause irreversible adverse health effects, or would impair an individual's ability to escape from a dangerous atmosphere.

An IDLH atmosphere due to oxygen deficiency is one in which the oxygen concentration is less than 19.5 percent. Where oxygen levels are normal, the concentration of a toxic substance necessary to create an IDLH atmosphere exceeds any regulated or recommended exposure levels and depends upon the specific toxicity of that substance. For example, carbon monoxide has an 8-hour time-weighted average (TWA) permissible exposure limit of 50 ppm and an IDLH concentration of 1,200 ppm (0.12 percent) whereas dimethyl sulfate has an 8-hour TWA permissible exposure limit of 1 ppm—with skin absorption designated as a significant route of exposure—and an IDLH level of 7 ppm.

Types of Respirators

What Is a Respirator?

The American Heritage Dictionary defines a respirator as "a screenlike device worn over the mouth or nose or both to protect the respiratory tract."³ Perhaps a better definition is that from NIOSH, which defines a respirator as "any device designed to provide the wearer with respiratory protection against inhalation of a hazardous atmosphere."⁴

Respirators provide protection either by removing contaminants from the air before it is inhaled or by supplying an independent source of breathable (respirable) air. A respirator that removes contaminants from ambient air is termed an *air-purifying respirator*. A respirator that provides breathing quality air from an independent source is referred to as an *atmosphere-supplying respirator*. Each of these categories is further classified according to the type of inlet covering and the mode of operation.

Anatomy of a Respirator

Whether you are considering an air-purifying respirator or a supplied-air respirator, it is important to understand the basic components of a respirator. The *respiratory inlet covering* is that part of a respirator that forms a protective barrier between the user's respiratory tract and an air-purifying device or breathing air source, or both. Depending upon the intended use and the level of protection necessary, the respiratory inlet covering may be a tight-fitting facepiece or a loose-fitting helmet, hood or suit.

The effectiveness of a tight-fitting respirator is dependent upon forming a tight seal between the respirator facepiece and the skin of the respirator user's face. Attached to the facepiece behind the air-purifying device or breathing air source is the *inhalation valve*, which is designed to permit unidirectional (one way) flow of filtered or breathing quality air into the respirator facepiece. Also attached to the facepiece is the *exhalation valve*, which allows exhaled air to leave the facepiece, but does not permit contaminated air to reenter the facepiece.

To help ensure a good seal at all times, tight-fitting facepieces are equipped with adjustable elastomeric straps that are located to permit anchoring around the head and neck of the respirator user.⁵ This ensures that the seal with the face of respirator user is not broken as the result of pivoting about a single anchor point. The parts of a tight-fitting respirator are identified in Figure 1a.

By comparison, a loose-fitting respiratory inlet covering (hood or helmet) does not require the formation of seal with the face but must rely on other means to provide respiratory protection. For this reason, loose-fitting inlet coverings are always used in a continuous flow, positive pressure mode of operation as shown in Figures 1b and 2.

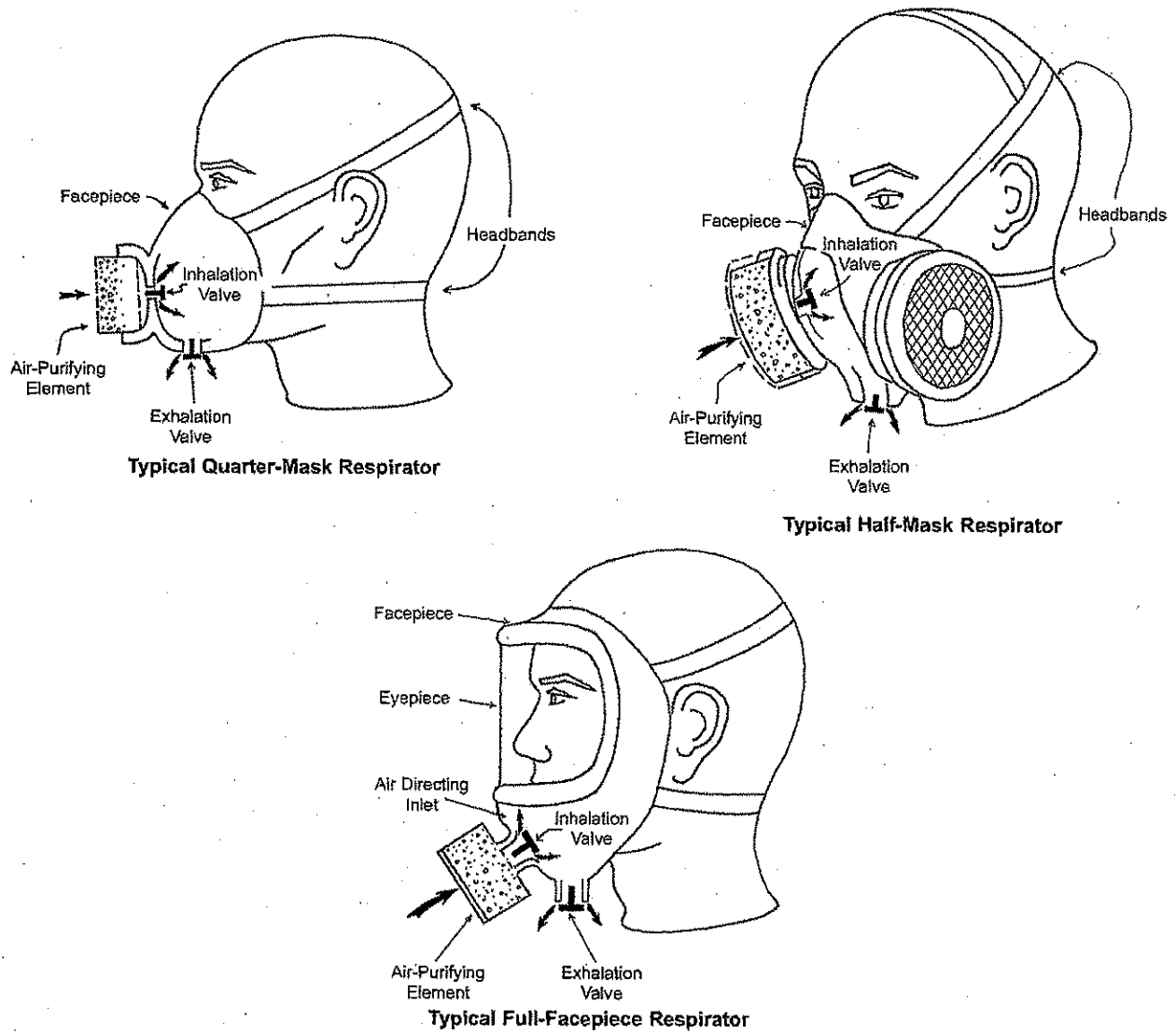
3. The American Heritage Dictionary, Second College Edition

4. 42 CFR Part 84

5. As of the date of this publication there is at least one N95 adjustable single strap respirator approved by NIOSH.

Figure 1a

Tight-Fitting Air-Purifying Respiratory Inlet Coverings
(Courtesy of OSHA)





COURSE EVALUATION FORM

Course Title: Integration of Respiratory Protection into Practice Among Health Care Workers

Date: May 30, 2013

Location: Chapel Hill, NC

Your sincere response to the evaluation will enable us to refine existing programs as well as develop more meaningful offerings. Thank you.

PLEASE CIRCLE YOUR RESPONSE.

	<u>LOW</u>			<u>HIGH</u>	
1. Will this course be helpful in your job?	1	2	3	4	5
2. Were class handouts adequate?	1	2	3	4	5
3. Were audio-visual aids adequate?	1	2	3	4	5
4. Overall impression of this course?	1	2	3	4	5
5. Please rate the meeting room.	1	2	3	4	5
6. Please rate the UNC staff.	1	2	3	4	5
7. Please rate the hotel & location.	1	2	3	4	5
Name of hotel _____					
8. Would you recommend this course?	1	2	3	4	5

INSTRUCTOR EVALUATION:

	<u>LOW</u>			<u>HIGH</u>	
Edie Alfano-Sobsey	1	2	3	4	5
Kathleen Buckheit	1	2	3	4	5
Pat Curran	1	2	3	4	5
Debbie Novak	1	2	3	4	5
Judy Ostendorf	1	2	3	4	5
Bonnie Rogers	1	2	3	4	5

9. Please list courses you would like to attend in the future:

[illegible]

NAME: _____
 TITLE: _____
 FIRM: _____
 ADDRESS: _____
 CITY: _____ STATE: _____ ZIP: _____
 PHONE: _____ EMAIL: _____

NAME: _____
 TITLE: _____
 FIRM: _____
 ADDRESS: _____
 CITY: _____ STATE: _____ ZIP: _____
 PHONE: _____ EMAIL: _____

RESPIRATORS, DONNING & DOFFING AND FIT TESTING



PAT CURRAN, CIH

Respirators

What is a respirator?

A respirator is a device designed to protect the wearer from inhaling harmful airborne dusts, fumes, mists, vapors, or gases. Including bio-aerosols.

A respirator must be NIOSH approved.

A respirator must be selected, worn and maintained in accordance with the OSHA *Respiratory Protection Standard, 29 CFR 1910.134*



Overview of Respirators

There are 2 types of respirators

- 1. Air Purifying Respirators: A respirator that removes harmful airborne contaminants from the worker's breathing zone by either a filter or chemical cartridge**

Air Purifying Respirator



Powered Air Purifying Respirator



Gas Mask



Overview of Respirators

There are 2 types of respirators

2. Atmosphere Supplying: Provides clean breathing air that is independent of the worker's breathing zone.

Supplied Air Respirators



SCBA



Escape SCBA



N95 RESPIRATORS

N95 Respirators are to be used only for protection against Particulates, including Bio-Aerosols



N95 Respirators do not provide protection against Gases and Vapors, including laboratory solvents and formalin

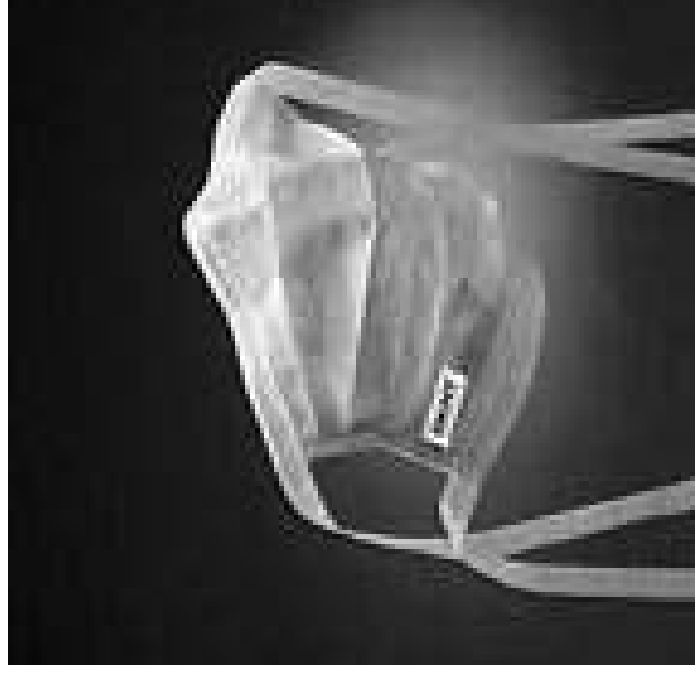
N95 Respirators

Respirator



≠

Surgical Mask



N95 Respirators

Respirators

*NIOSH Approved

*Tight Fitting

*Protects Against Small
Airborne Particles – Influenza

*Comply with OSHA to Protect
Employees

Surgical Masks

*FDA Cleared

*Loose Fitting

*Barrier For Splashes of
Large Droplets of Body Fluids

*Protect Patients and Can't
Be Relied on to Protect
Workers Against Airborne
Infectious Agents

N95 Respirators

There are Surgical N95 Respirators that are both:

➤ NIOSH Approved N95 Respirators

AND

➤ FDA Cleared as Surgical Masks



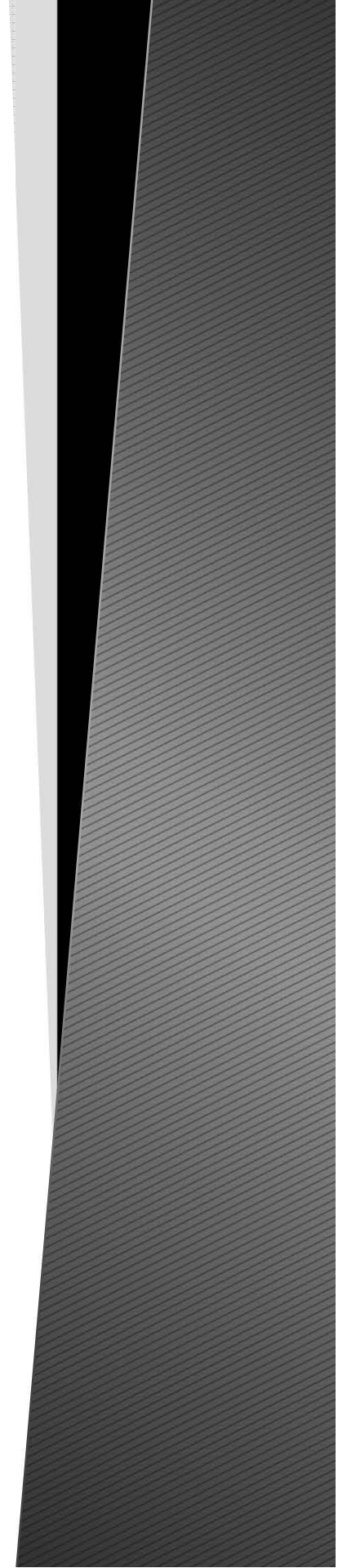
Resource: OSHA Training Video (5 mins. in duration)

“The Difference Between Respirators and Surgical Masks”

http://www.osha.gov/SLTC/respiratoryprotection/trainin_g_videos.html

Note: Video is in both English and Spanish

DONNING AND DOFFING RESPIRATORS



DONNING AND DOFFING A RESPIRATOR

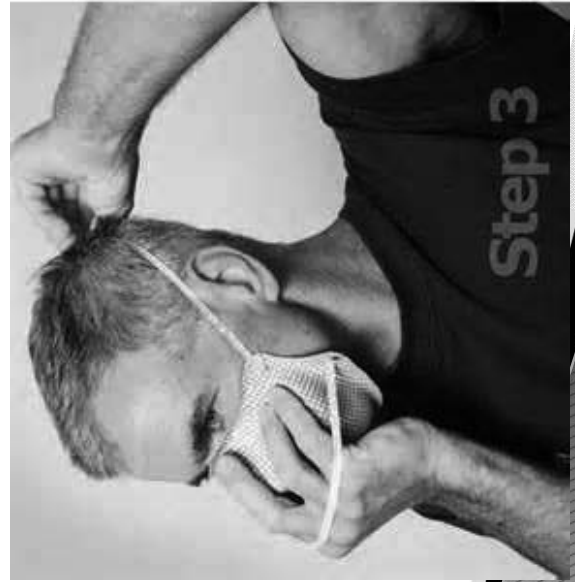
- Each Make and Model of Respirator is put on and taken off differently.
- This can be true even with the same Manufacturer
- Each Respirator comes with Respirator SPECIFIC donning and doffing instructions

Therefore, always take the time to read the Manufacturer's instructions





DONNING A N95 RESPIRATOR



RESPIRATOR FIT CHECK

**Fit Check Your Respirator Each Time You
Put It On**



**N95
Respirator**

Positive or Negative Fit Check

DOFFING AN N95 RESPIRATOR

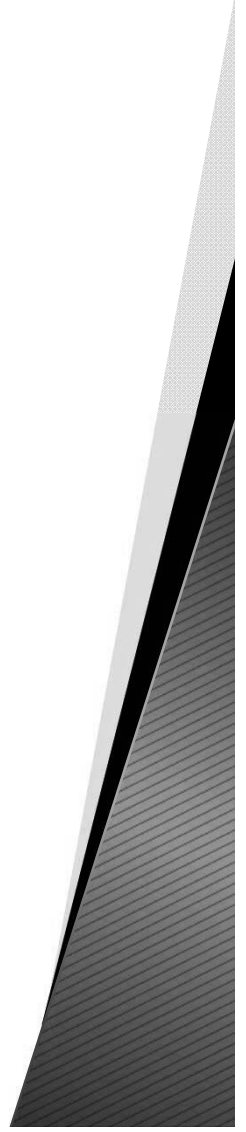
There is a correct procedure for taking an
N95 Respirator off

- Use the straps
- Do not touch the front of the respirator

This reduces the potential for getting any
contaminant on your hands

DONNING AND DOFFING A RESPIRATOR

Demonstration



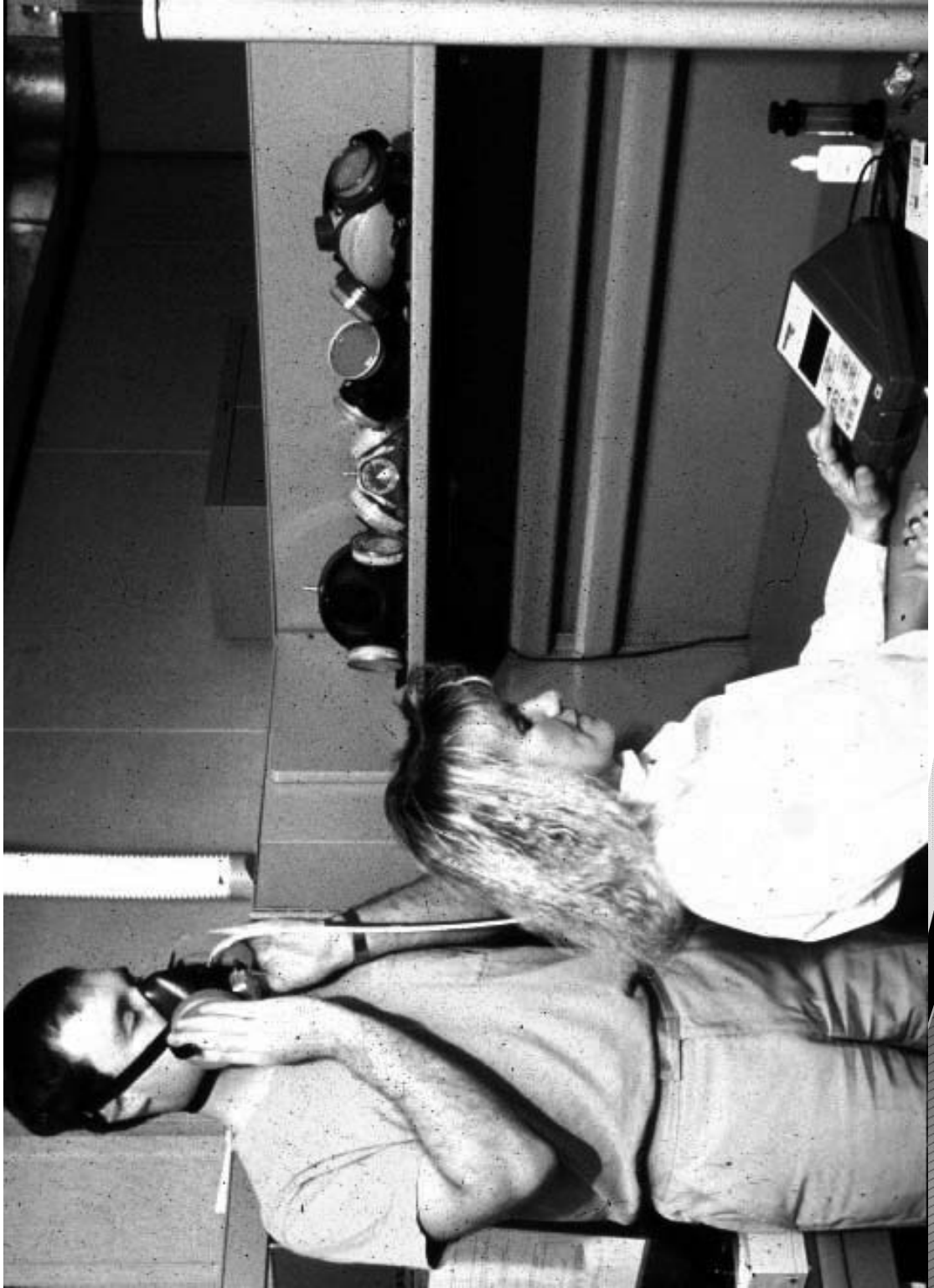
DONNING AND DOFFING A RESPIRATOR

CONGRATULATIONS!

Demonstration Lesson:

- **Always follow the Manufacturer's Instructions**
- **An improperly donned or doffed Respirator poses an preventable health risk to the wearer**

Fit Testing



FIT TEST DEFINITION

**The use of a challenge agent to evaluate the
fit of a respirator on an individual**



Reasons for Fit Testing

- ▶ Select brand, model, and size of Respirator for each user
- ▶ Comfort of Respirator
- ▶ Compatibility with other protective equipment, e.g., safety glasses (Fit Testing is done wearing other PPE)
- ▶ Meet Legal Requirements
 - 1910.134(f)(1) – (8) and Appendix A

Fit Testing Frequency

- ▶ Employees using any (negative or positive pressure) tight-fitting face piece respirators must pass either a qualitative fit test (QLFT) or quantitative fit test (QNFT):
 - prior to initial use,
 - whenever a different respirator face piece (size, style, model or make) is used, and
 - at least annually thereafter

Fit Testing Frequency

- ▶ Must conduct an additional fit test whenever the employee reports, or the employer or PLHCP makes visual observations of, changes in the employee's physical condition (e.g., facial scarring, dental changes, cosmetic surgery, or obvious change in body weight) that could affect respirator fit

Overview of Respirator Fit Testing

Fit Testing

- **Fit testing must be performed for ALL tight fitting respirator face pieces**
- **A medical evaluation must be performed prior to fit testing**
- **Fit testing must be performed before a respirator is required to be used in the workplace**
- **Fit testing must be done following an OSHA protocol**

Fit Testing

Fit Test Required



Tight Fitting Face Piece



Fit Test Not Required

Loose Fitting Face Piece



Overview of Respirator Fit Testing

Fit Testing Protocols

There are 2 types of fit testing:

1. **Qualitative Fit Testing (QLFT) - Pass or Fail**
(Saccharin, Bitrix, Banana Oil, Irritant Smoke)



Overview of Respirator Fit Testing

**Qualitative Fit Testing
using Saccharin or
Bitrix**

**Pass - if fit test agent
is not sensed (taste,
smell or irritation)**

**Fail - if fit test agent is
sensed**



Overview of Respirator Fit Testing

Fit Testing

There are 2 types of fit testing:

2. Quantitative Fit Testing (QNFT) - Minimum Fit Factor
(100, 500)
(Aerosols, Ambient Air, Negative Pressure)





Overview of Respirator Fit Testing

**Quantitative Fit
Testing:
Full face
respirator with
an adaptor**



Overview of Respirator Fit Testing

Fit Testing

- QLFT - cheap (\$250), easy, subjective, pass/fail
- QNFT - expensive (\$8,000 +), more technical, objective, numerical fit factor, print out for records
 - OSHA accepts both fit testing methods



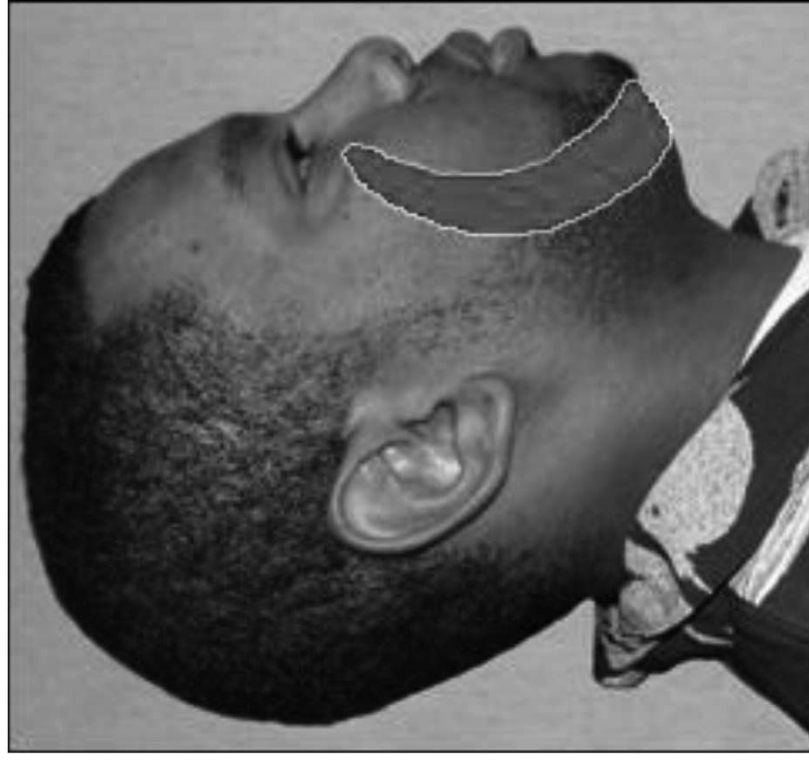




Overview of Respirator Fit Testing

Fit Testing

- **Beards and other facial hair interfere with the face to face piece seal of the respirator**
- **Jeopardizes the health of the wearer**
- **Fit testing shall not be performed as per OSHA**



Experience: A day's stubble will

cause a respirator to leak

**Must be clean shaven at
the start of work**



QLFT OVERVIEW AND DEMONSTRATION

I AM LOOKING FOR A VOLUNTEER!

**Who is willing to assist in this fantastic
demonstration?**

QLFT RESPIRATOR FIT TEST

A QLFT fit test is done in three parts

- Select the model and size of the respirator face piece – small, medium or large.
- Sensitivity test – to see if you can taste saccharin, **WHILE NOT WEARING A RESPIRATOR.**
- Actual fit test – a series of 7 exercises are done for 1 minute each, **WHILE WEARING A RESPIRATOR.**

QLFT SENSITIVITY & FIT TEST

Equipment Overview

Here is the equipment that will be used in performing the saccharin sensitivity and fit tests:



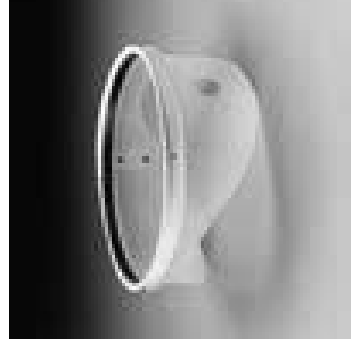
1. Sensitivity and fit test solutions.
The sensitivity solution is more dilute and not as sweet as the fit test solution.



2. Nebulizer: used to generate a saccharin mist for both the sensitivity and fit tests.



3. Fit test hood



and collar

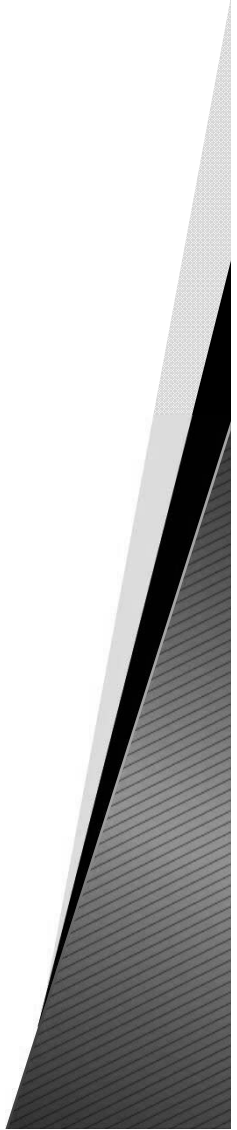


RESPIRATOR SENSITIVITY & FIT TEST

Testing Preparation

Since both the sensitivity test and fit test rely on the sense of taste:

- ▶ Do not eat, drink or chew anything sweet for 15 minutes prior to performing both the sensitivity test and the fit test exercises.
- ▶ The respirator should be worn for at least 5 minutes before starting the fit testing sequence of exercises.



QLFT SENSITIVITY TEST

The sensitivity test is done by generating a saccharin mist into the hood while you are not wearing a respirator.

You should mouth breath with you tongue slightly extended.

Let the tester know if you taste the saccharin.

Perform
10, 20, 30
Nebulizer
Squeezes



Note
number of
squeezes to
taste saccharin

QLFT RESPIRATOR FIT TEST

Physical Checks

Fit testing is done by generating a saccharin mist into the hood while you are wearing a respirator.

- The saccharin is misted into the hood during each exercise.
- Respirator must be on for at least 5 minutes before starting the fit testing sequence of exercises.
- Again, you should mouth breath with you tongue slightly extended.
- If you can taste the saccharin while wearing a respirator, the respirator does not fit properly.
- If you do not taste the saccharin, the respirator fits properly.





QLFT RESPIRATOR FIT TEST

Exercises

- ▶ Perform each exercise for 1 minute.
 - ▶ Mist saccharin into hood at each exercise.
1. Normal Breathing
 2. Deep Breathing
 3. Turning Head Side to Side
 4. Moving Head Up and Down
 5. Talking – Pledge of Allegiance
 6. Bending Over or Jogging in Place
 7. Normal Breathing
- ▶ *Remember, if you taste saccharin at any time, let tester know.*

QLFT DEMONSTRATION

A BIG round of applause for our volunteer!!



QNFT Fit Testing





QNFT RESPIRATOR FIT TEST

Exercises

- ▶ Perform each exercise for 1 minute, except grimace which is done for 15 seconds
 1. Normal Breathing
 2. Deep Breathing
 3. Turning Head Side to Side
 4. Moving Head Up and Down
 5. Talking – Pledge of Allegiance
 6. Grimace (15 seconds)
 7. Bending Over or Jogging in Place
 8. Normal Breathing

Remember you need an overall fit factor ≥ 100 for half face piece respirators and ≥ 500 for full face piece respirators

RESPIRATORS, DONNING & DOFFING AND FIT TESTING

Any Questions, Comments or Observations?

230

Thanks!

Pat Curran, CIH
(919) 641-2517
pci@earthlink.net

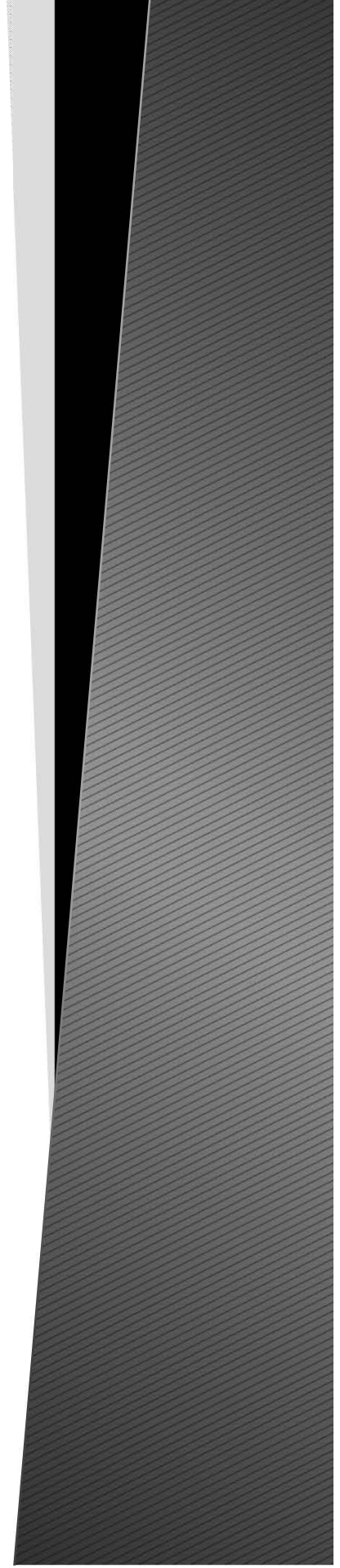


Nurses: Granddaughter and Grandmother



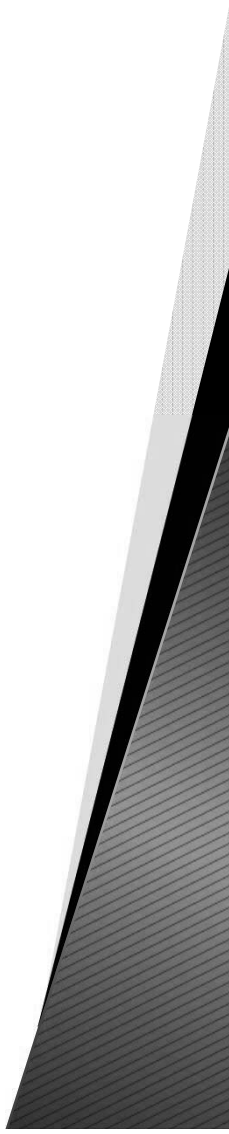
Respiratory Protection for Health Care Workers: Program Requirements

May 30, 2013
Edie Alfano-Sobsey, PhD



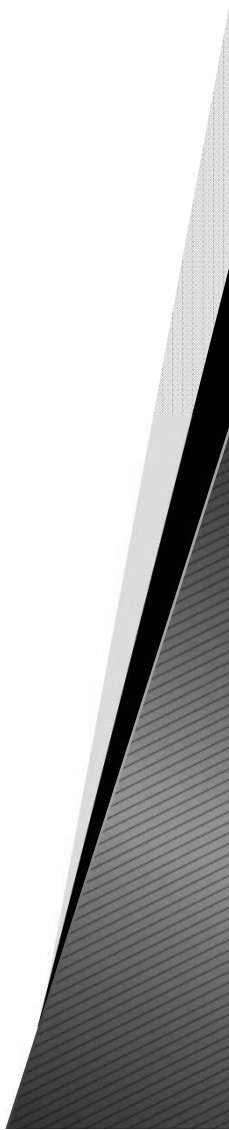
Outline

- ▶ Potential Respiratory Hazards for Health Care Workers
- ▶ Use of Personal Protective Equipment
- ▶ Respiratory Protection Program Requirements



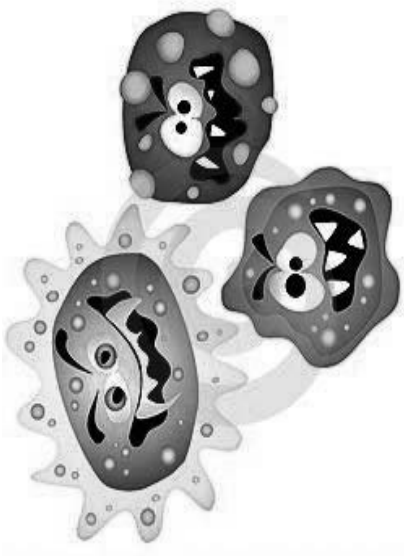
Respiratory Hazards for Public Health Workers

» » Some examples



Respiratory Hazards

Biological (organisms or biological agents that can be dispersed through the air)



Non-biological
(respiratory irritants, allergens, chemicals)



Microorganisms are particles!



Examples of Microorganisms Sizes		
Agent	Particle Size (microns)	Type
Anthrax	1 - 5	Spore
Tuleremia	0.125 - 0.7	Bact
Plague	0.5 - 2	Bact
TB	0.2 -0.5	Bact
Corona Virus	0.1	Virus

Transmission Mechanisms for Respiratory Diseases

- ▶ **Droplet spread**
 - large-particles $> 5 \mu\text{m}$
 - generated by coughing, sneezing, talking, or performance of procedures and
 - spread over short distance
 - e.g. pertussis, influenza, mumps, meningitis
- ▶ **Airborne by droplet nuclei**
 - evaporated droplets, $5 \mu\text{m}$ or smaller, containing microorganisms
 - remain suspended in air and dispersed widely by air currents within a room or over a long distances
 - e.g. measles, smallpox/monkeypox, tuberculosis (TB)
- ▶ **Combination of droplet and airborne**
 - Norovirus, Influenza?
- ▶ **Unknown**

Head Airways

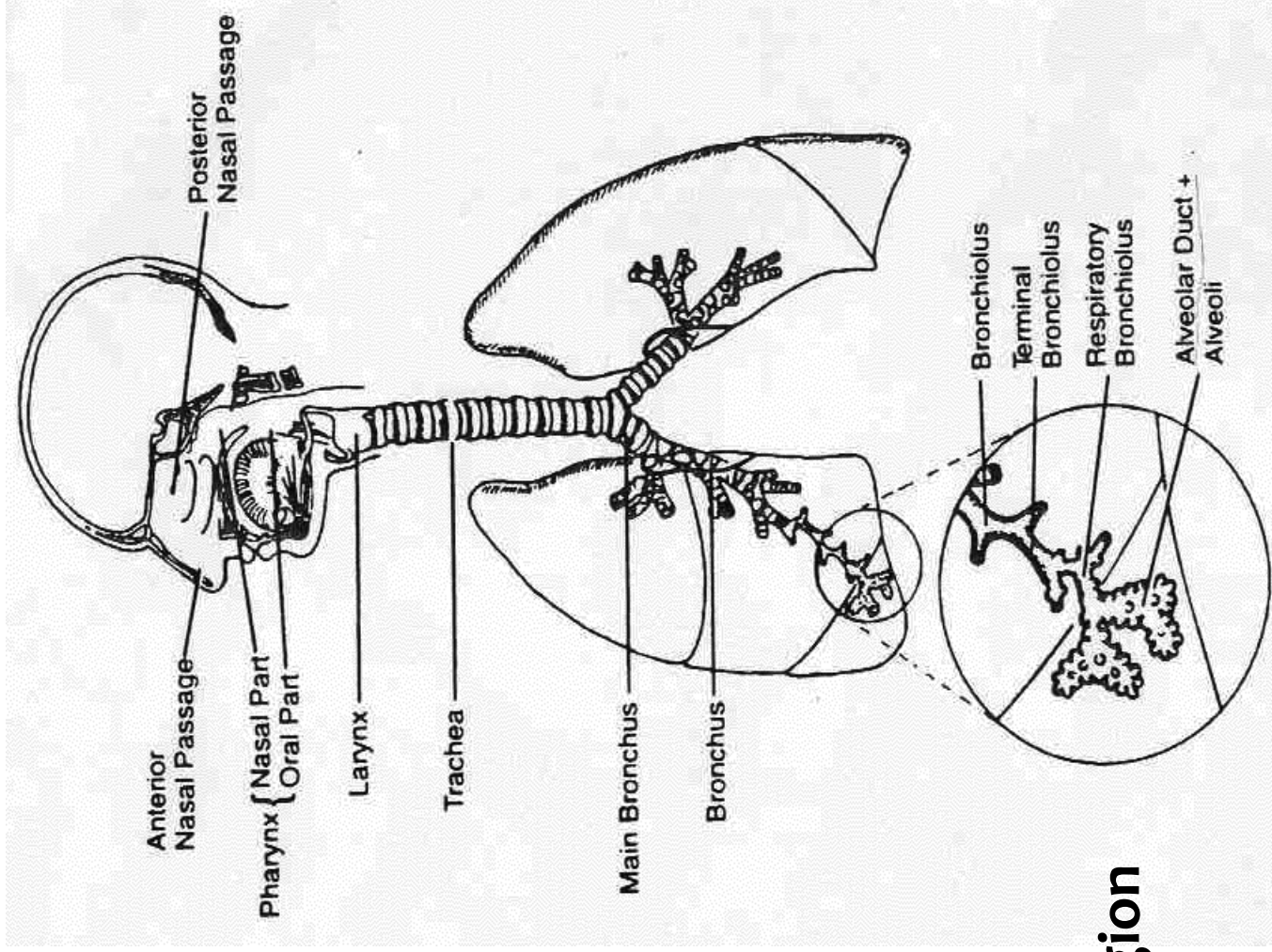
5-30 mm

Lung Airways/ Tracheobronchial Region

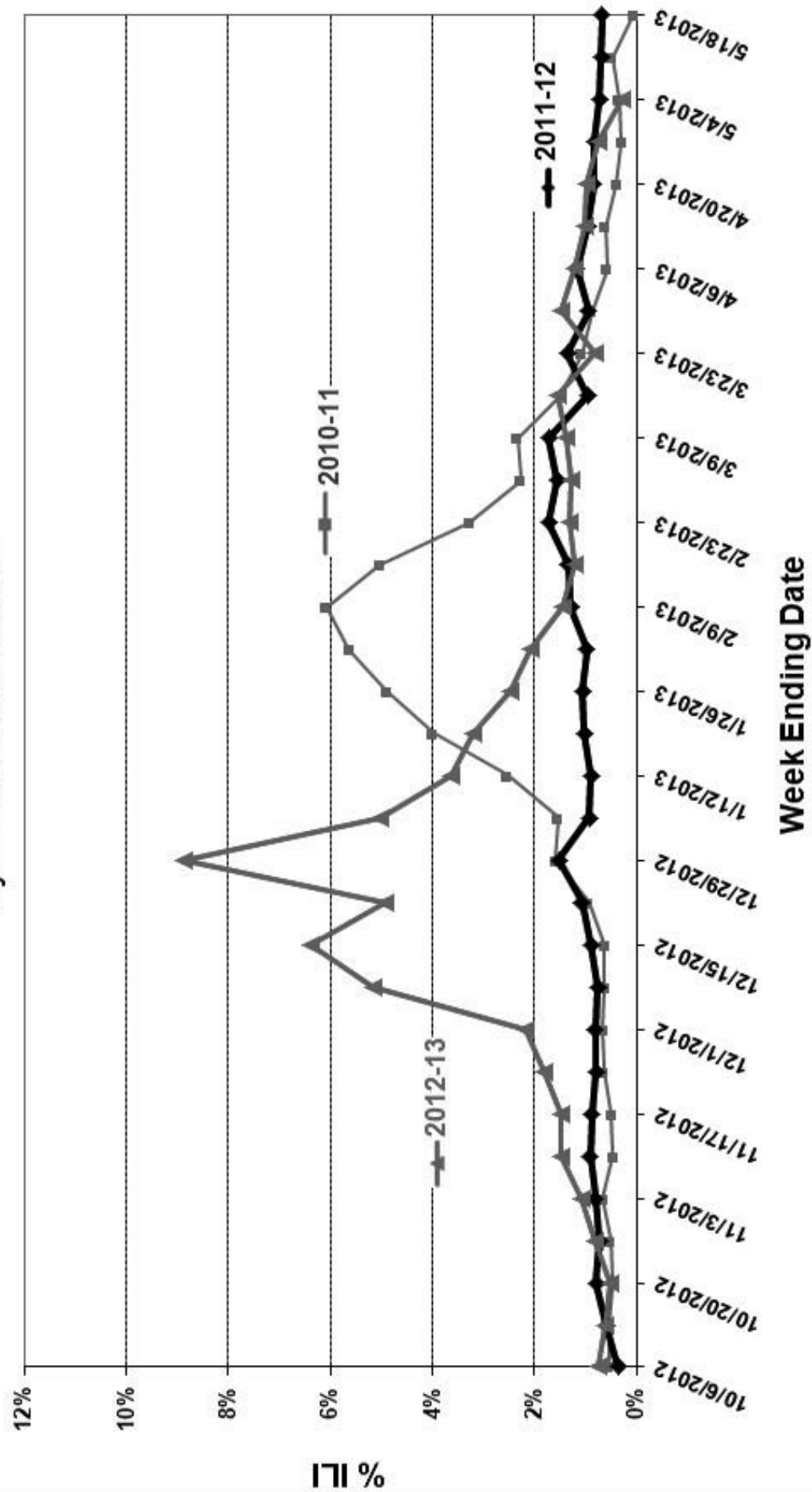
1-5 mm

Alveolar/Pulmonary Region

< 1 mm



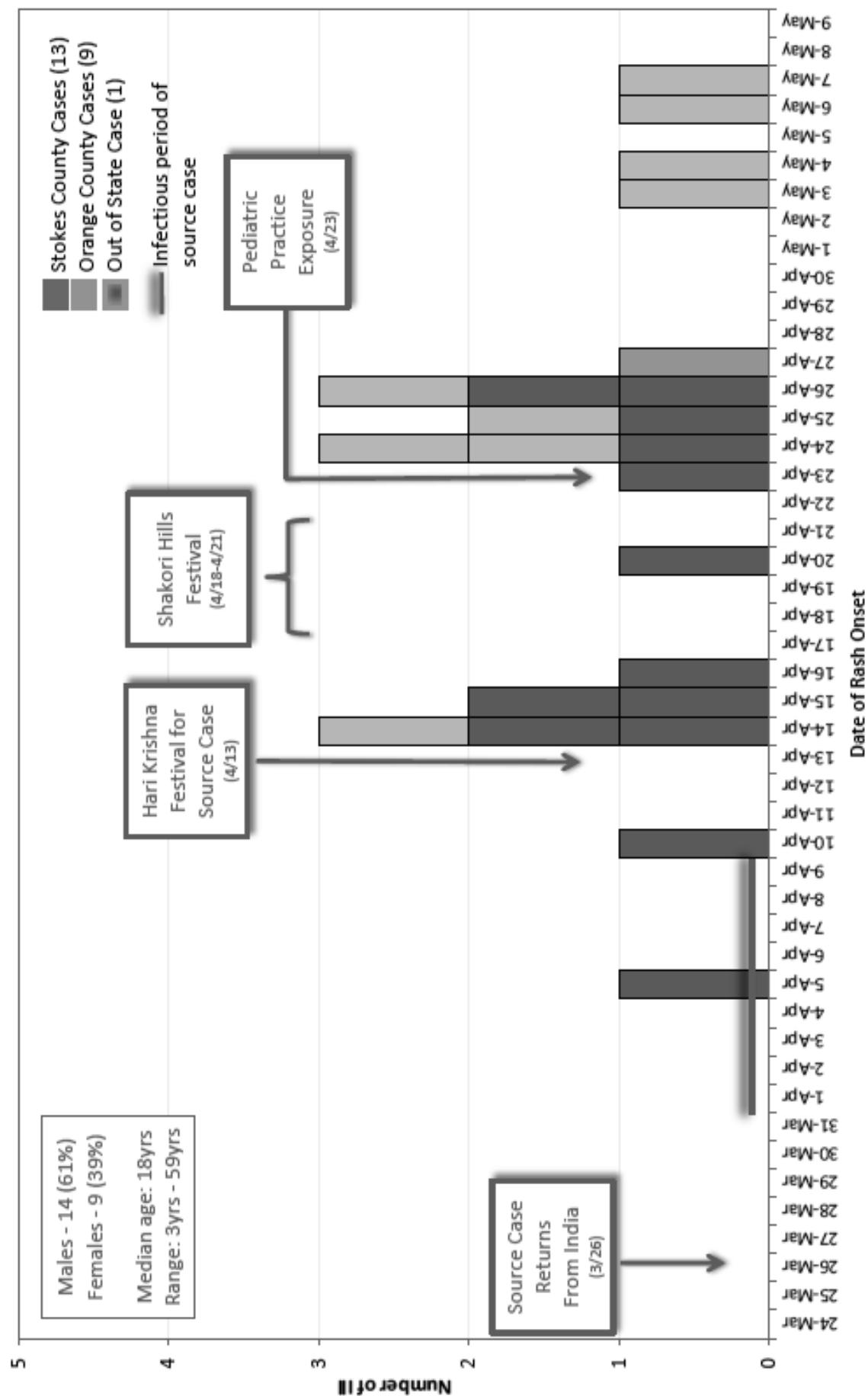
INFLUENZA SURVEILLANCE, NC 2012-2013 Influenza-Like Illness in LINet Outpatient Visits, by Influenza Season



Note: Week ending displayed is for 2011–2012 influenza season. Flu seasons for previous years may have different week ending dates, but these only vary by a few days.

Number of Measles Cases (Lab-confirmed and Epi-linked) by Date of Rash Onset: North Carolina 2013 (n=23)

May 8, 2013



When to use Personnel Protective Equipment



Hierarchy of Controls for Exposure Prevention in Healthcare Settings

- ▶ **Elimination of exposures**
 - e.g. minimize outpatient visits for patients with mild influenza-like illness, denying entry to visitors who are sick
- ▶ **Administrative controls**
 - e.g. Requiring flu vaccines for health care workers
- ▶ **Engineering controls**
 - e.g. use of airborne infection isolation room (negative pressure)
- ▶ **Personal Protective Equipment (PPE)**
 - gloves, gown, mask, respirator



Last resort

Mask versus Respirator

- ▶ **Droplet Precautions:**
 - ▶ When infectious agent in respiratory secretions transmitted over short distance
- ▶ **Airborne Precautions:**
 - ▶ When infectious agent is transmitted over long distances

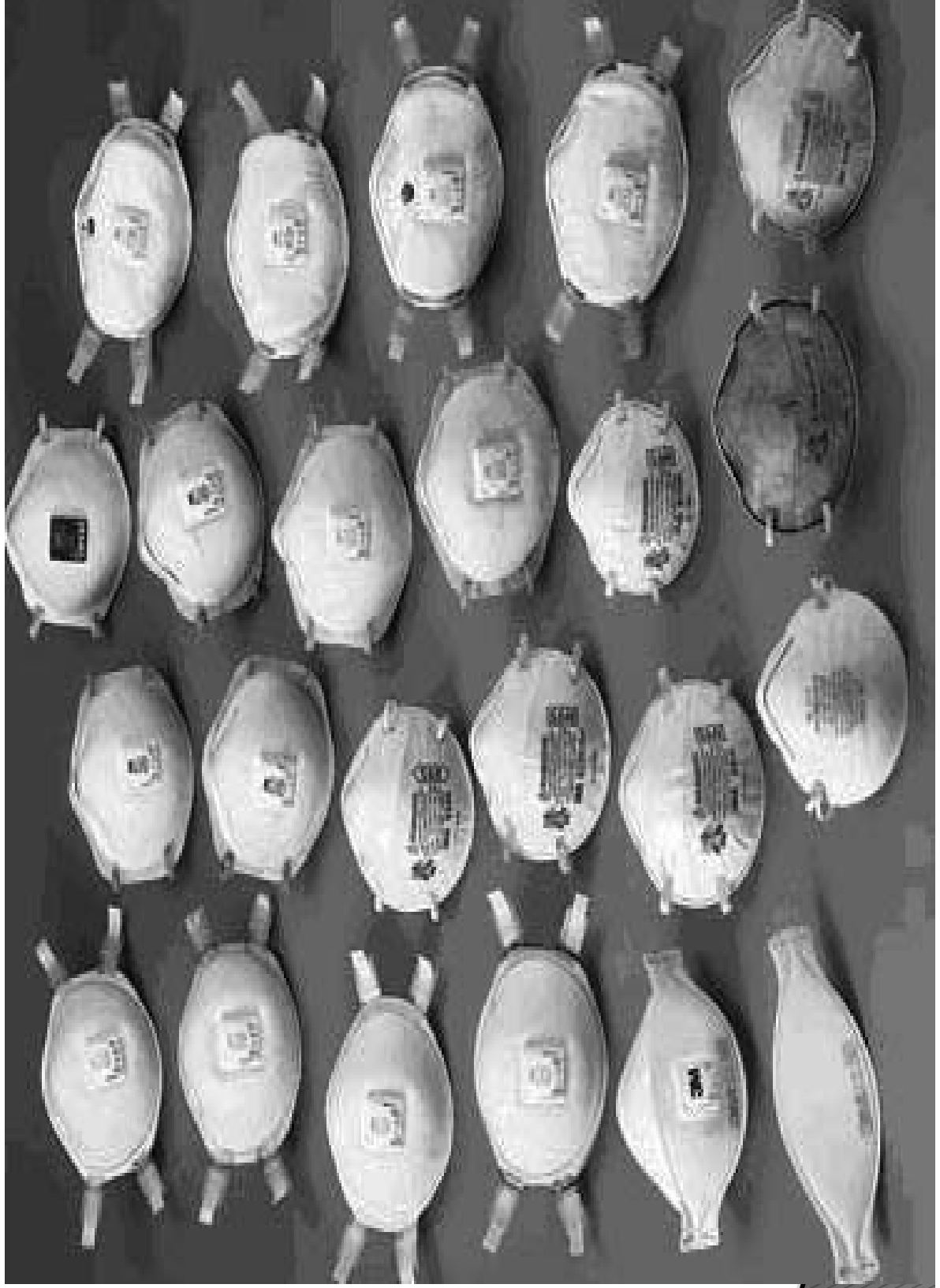


Mask



Respirator (e.g. N-95)

How does a particulate respirator (N-95) protect us?



Selection: Filter Series

- ▶ Selection of N-, R-, and P-series filters depends on the presence or absence of oil particles:
 - If **no** oil particles are present → use any series (N,R or P)
 - If oil particles **are** present → use *only* R or P series
 - If oil particles are present **and** the filter is to be used more than one work shift → use *only* P

N = *Not* resistant to oil

R = *Resistant* to oil

P = Oil *Proof*

Selection: Filter Efficiency

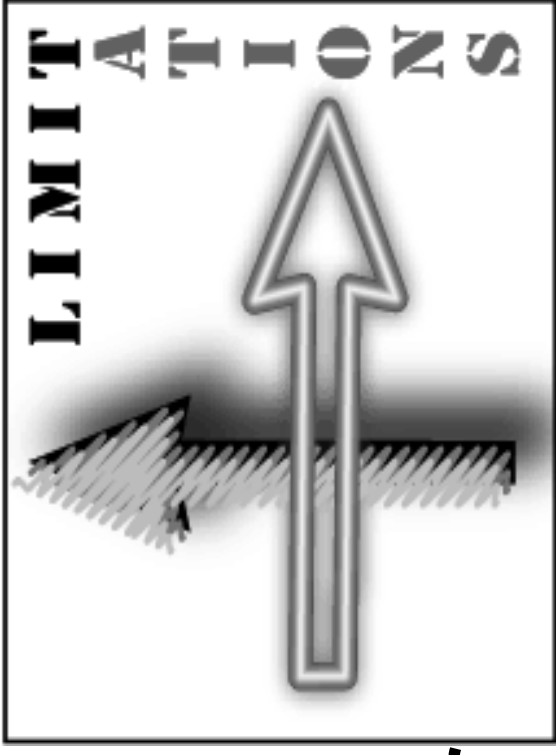
- Selection of filter efficiency (i.e., 95%, 99%, or 99.97%) depends on how much filter leakage is acceptable.

- N-95- captures at least 95% of the most penetrating particle (0.3 microns) and captures more than 95% of particles if the particle sizes are smaller or larger



N-95 Limitations

- ▶ Improper fit allows unfiltered air to enter
- ▶ Can not to be used in an oxygen deficient atmosphere
- ▶ Can not to be used with gasses or chemicals
- ▶ Respirators reduce, but do not eliminate airborne contaminants.



Respiratory Protection Program Requirements



Program Administration



The Administrator:

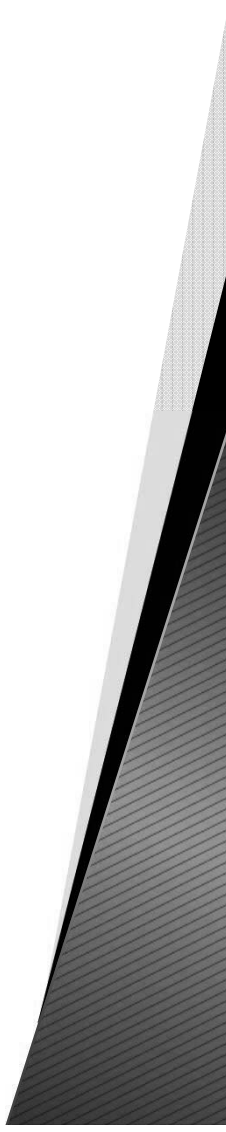
- is qualified through training or experience
- oversees the program and ensures that the program is OSHA complaint
- develops a written program with worksite-specific procedures
- updates the program to reflect changes in the workplace that affect respirator use

Respirator Program Elements

1. Hazard evaluation
2. Selection of respirators
3. Medical evaluation
4. Fit testing
5. Appropriate use, maintenance and care of respirators
6. Breathing air quality and use
7. Training
8. Program evaluation

Hazard Evaluation

- ▶ Identify potential exposure that may require use of respiratory protection
- ▶ Complete for all respiratory hazards including exposures to chemical as well as infectious diseases
- ▶ Systematically consider activities in your unit



Selection of Respirators

- ▶ Provide NIOSH approved respirators based on the respiratory hazards
- ▶ Provide a variety of models and sizes



Medical Evaluation

- Provide medical evaluation before **initial** fit test
- A physician or other licensed health professional must perform medical evaluations using a medical questionnaire
- Provide follow-up medical examination if positive responses to any questions (among 1 through 9) on the questionnaire or demonstrated need on initial evaluation

WAKE COUNTY HUMAN SERVICES
Employee Information Form
Revised 10/2014, Version C, January 1, 2008

New to employees: Your employer must allow you to answer this questionnaire during actual working hours, or at a time and place that is convenient to you. To ensure your confidentiality, your employer or supervisor must not look at your responses to this questionnaire. The information you provide on this questionnaire will be used to determine if you are a professional who will receive it. The Program Administrator will keep employee medical information confidential to a secure location.

Section 1: Personal Information (This section is for your use only)
 The following information must be provided by every employee who has been selected to use any type of respirator. (Please print)

Today's Date: _____
 Name: _____ Sex: Male Female Height: _____ ft. _____ in. Weight: _____ lbs.
 Date of Birth: _____
 Job Title: _____ Supervisor Name: _____ Supervisor Phone: _____
 A phone number where you can be reached (with area code): _____
 The best time to reach you at this number is: _____
 How many years have you been employed by the City of Raleigh? _____
 Have you ever been employed by the City of Raleigh? Yes _____ No _____ If Yes, "last type" _____

Section 2: Medical History (This section is for your use only)
 Questions 1 through 9 must be answered by every employee who has been selected to use any type of respirator. Please circle "Yes" or "No" and explain "yes" answers. Give dates or approximate ages.

1. Yes _____ No _____ Do you currently smoke tobacco, or have you smoked tobacco in the last month?
 Yes _____ No _____
 2. Have you ever had any of the following conditions?
 Yes _____ No _____
 a. Severe Allergy _____
 b. Diabetes (sugar disease) _____
 c. High blood pressure _____
 d. Chronic phlegm (not of chest or sinuses) _____
 e. Trouble swallowing _____
 3. Have you ever had any of the following pulmonary or lung problems?
 Yes _____ No _____
 a. Asthma _____
 b. Emphysema _____
 c. Chronic bronchitis _____
 d. Emphysema _____
 e. Pneumonia _____
 f. Tuberculosis _____
 g. Silicosis _____
 h. Other _____
 4. Have you ever collapsed lungs?
 Yes _____ No _____
 5. Have you ever had a heart attack?
 Yes _____ No _____
 6. Have you ever had a stroke?
 Yes _____ No _____
 7. Have you ever had a seizure?
 Yes _____ No _____
 8. Have you ever had a blood clot?
 Yes _____ No _____
 9. Any other lung problem that you've been told about.
 Yes _____ No _____

01/08 1

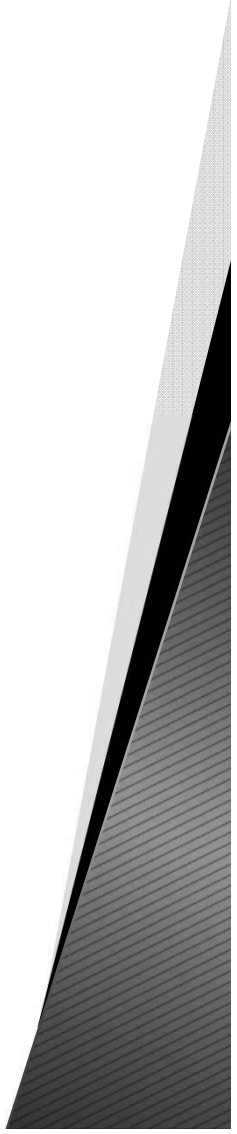
Medical Evaluation Continued



- ▶ **Annual medical evaluation is not required**
- ▶ **Employer must provide additional medical evaluation if:**
 - **Employee has medical signs or symptoms related to the ability to use a respirator**
 - **The medical provider, supervisor, or program administrator decides an employee needs to be reevaluated**
 - **Information from the respirator program, including observations made during fit testing and program evaluation, indicates a need**
 - **Change occurs in workplace conditions that increase the physiological burden on an employee**

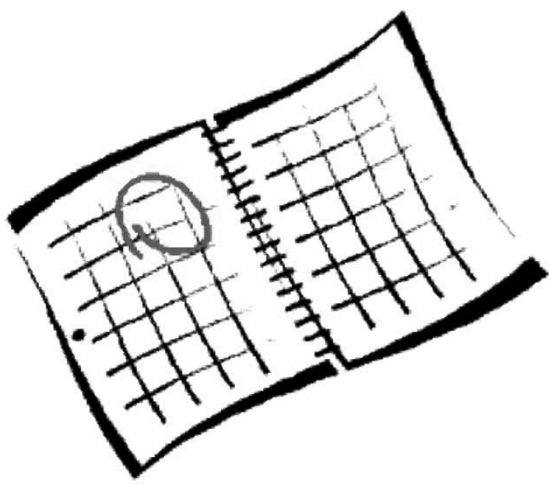
Fit-Testing

- **To assure the respirator fits correctly to eliminate or minimize leakage between the face and respirator allowing unfiltered air to enter respirator**



When Fit Testing is Required

- ▶ Employees using tight-fitting facepiece respirators must pass a qualitative fit test (QLFT) or a quantitative fit test (QNFT):
 - Before the respirator is used the first time,
 - Whenever a different respirator facepiece (size, style, model or make) is used, and
 - At least annually thereafter
 - Also if there is a change in the employee's physical condition



Qualitative Fit Test (QLFT)

QLFT is a pass/fail fit test to assess how the respirator fits and relies on the individual's response to the test agent



Quantitative Fit Test (QNFT)

QNFT is an assessment of how well the respirator fits by numerically measuring the amount of leakage into the respirator.



Respirator Storage

- Store respirators in a place where they will not be damaged or contaminated.
- Keep them away from dust, sunlight, extreme temperatures, excessive moisture, and damaging chemicals
- Store them in a way that will prevent the deformation of the face piece and exhalation valve



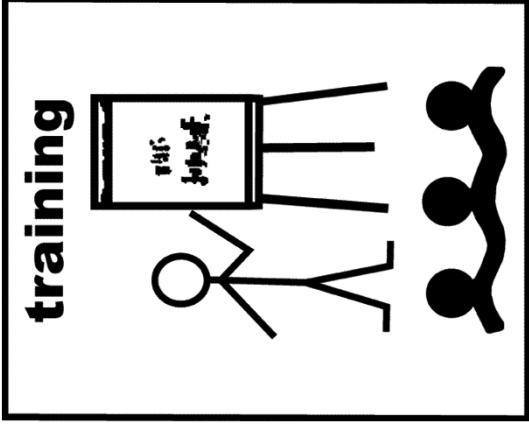
Training and Information

Employers must provide effective training to employees who are required to use respirators on respirator use and hazards



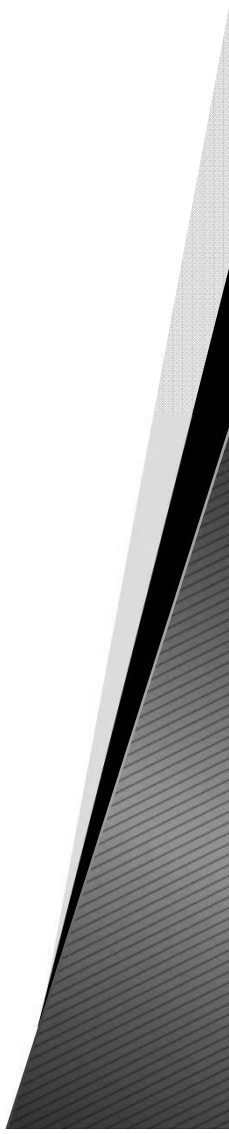
Training and Information (cont'd)

- Training must be provided before a respirator is used
- Retraining is required **annually**, and when:
 - there are changes in the workplace or types of respirators available
 - the employee's knowledge or use is not adequate
 - whenever retraining is deemed necessary by the administrator
- If an employee chooses but is not required by this standard or by the employer to wear a respirator, the basic advisory information in 29 CFR 1910.134 Appendix D must be provided to employees

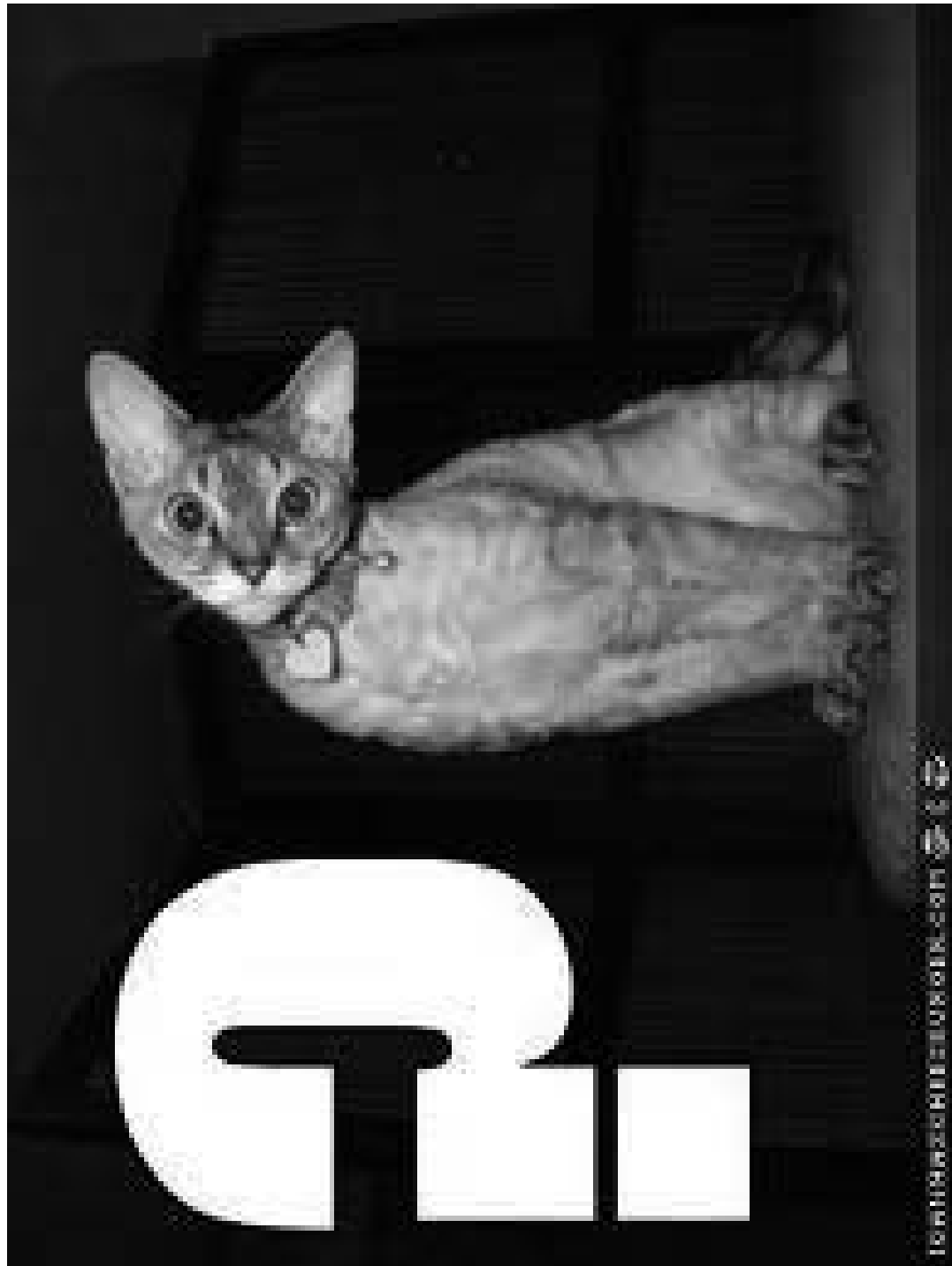


Program Evaluation

- ▶ Ensure that the written respiratory protection program is being properly implemented
- ▶ Consult with employees to ensure that they are using the respirators properly
- ▶ Identify and correct problems



Questions?



Respiratory Protection: Healthcare Compliance

Debra A. Novak, DSN, RN

CDC/NIOSH

National Personal Protective Technology Laboratory

Pittsburgh, PA

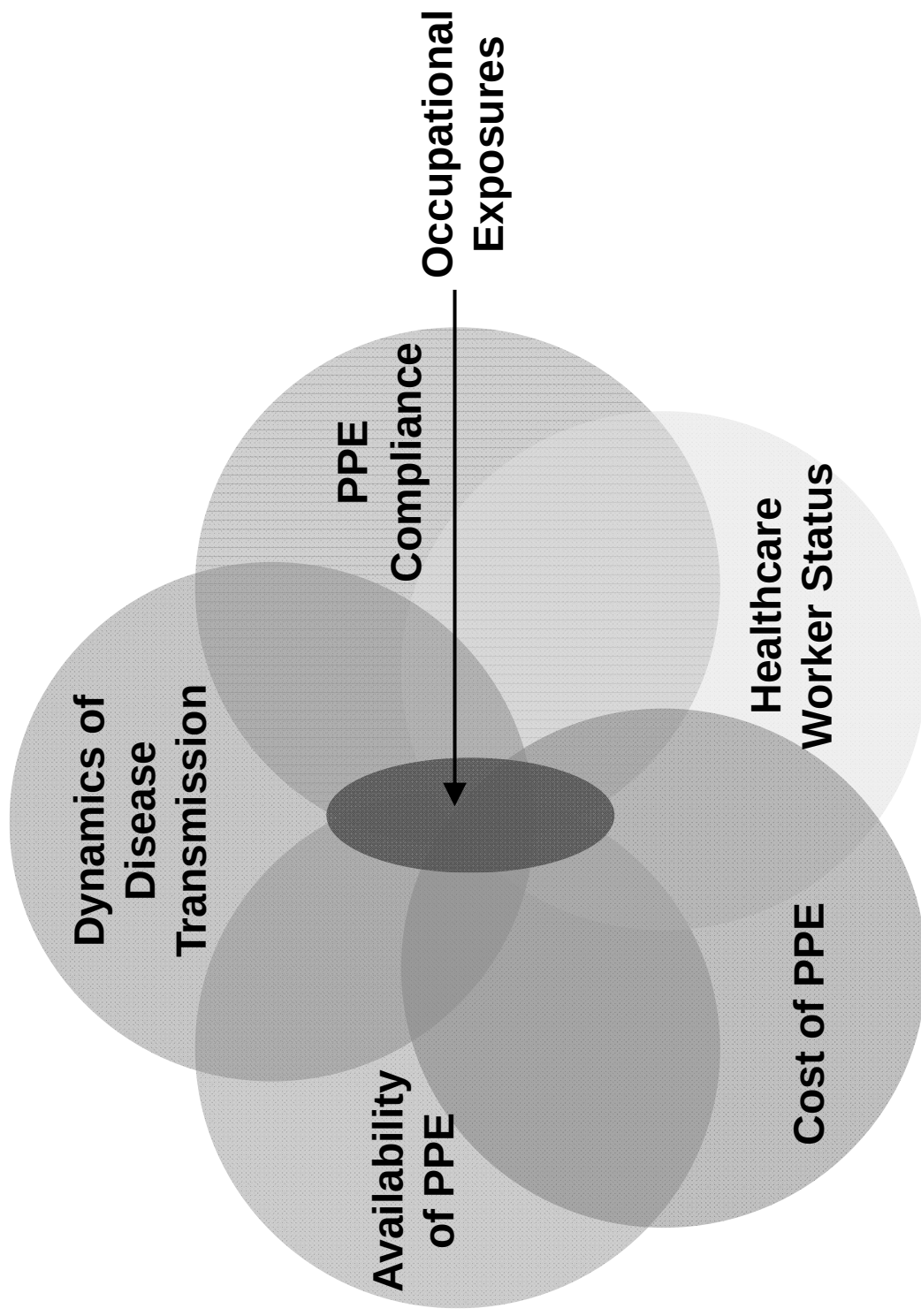
May 30, 2013

Objectives

This presentation will:

- **Describe the status of hospitals' respiratory protection programs and healthcare workers' proper use of respiratory protection.**
- **Identify targeted intervention strategies to ensure respiratory protection best practices in healthcare workplaces.**

Variables Influencing Healthcare Workers' Use of PPE



www.thelancet.com/infection Vol 9 December 2009

PPE Compliance

The protective effect of PPE is inconsequential if a HCW is **non-compliant.**

Clinical Events

California Bacterial Meningitis

H1N1

NPPTL Research Initiatives

Clinical Challenges

OR Smoke Plume

Compliance with Proper Use

California Bacterial Meningitis

Background

Two individuals became seriously ill and hospitalized with a highly virulent strain of meningitis.

Hefty fines were issued by Cal/OSHA to the medical center and the police and fire departments.

Lesson

The individuals who voluntarily wore respiratory protection (N95s) did not get sick.

Accessed from: www.sfgate.com/2010/04/21

H1N1 Take Home Messages

- Healthcare organizations displayed confusion.
- Preparedness was weak....plans exist on paper.
- Most HCWs recall fit test at hire with minimal updates.
- Fit-testing is the focus...ongoing training isn't.
- HCWs are infrequent and complacent users of RPE.
- HCWs are improperly using (donning and doffing) respirators.
- Respirators (N95s) used for TB.
- HCW deaths were reported due to H1N1.
- Infection control (IC) practices were “*not being faithfully followed*”.

Compliance with Use of PPE

- Evidence of marginal compliance with respiratory protection guidance....less than 60%.
- Specifically, there was a lack of adherence to the proper use of infection control precautions (respiratory protection) documented during the H1N1 influenza pandemic. CDC

“ Infection control (IC) practices are *not being faithfully followed...* failure to recognize patients and activities that warrant specific IC practices.” CDC

“ Compliance with routine infection control procedures is an increasingly important issue .” OSHA



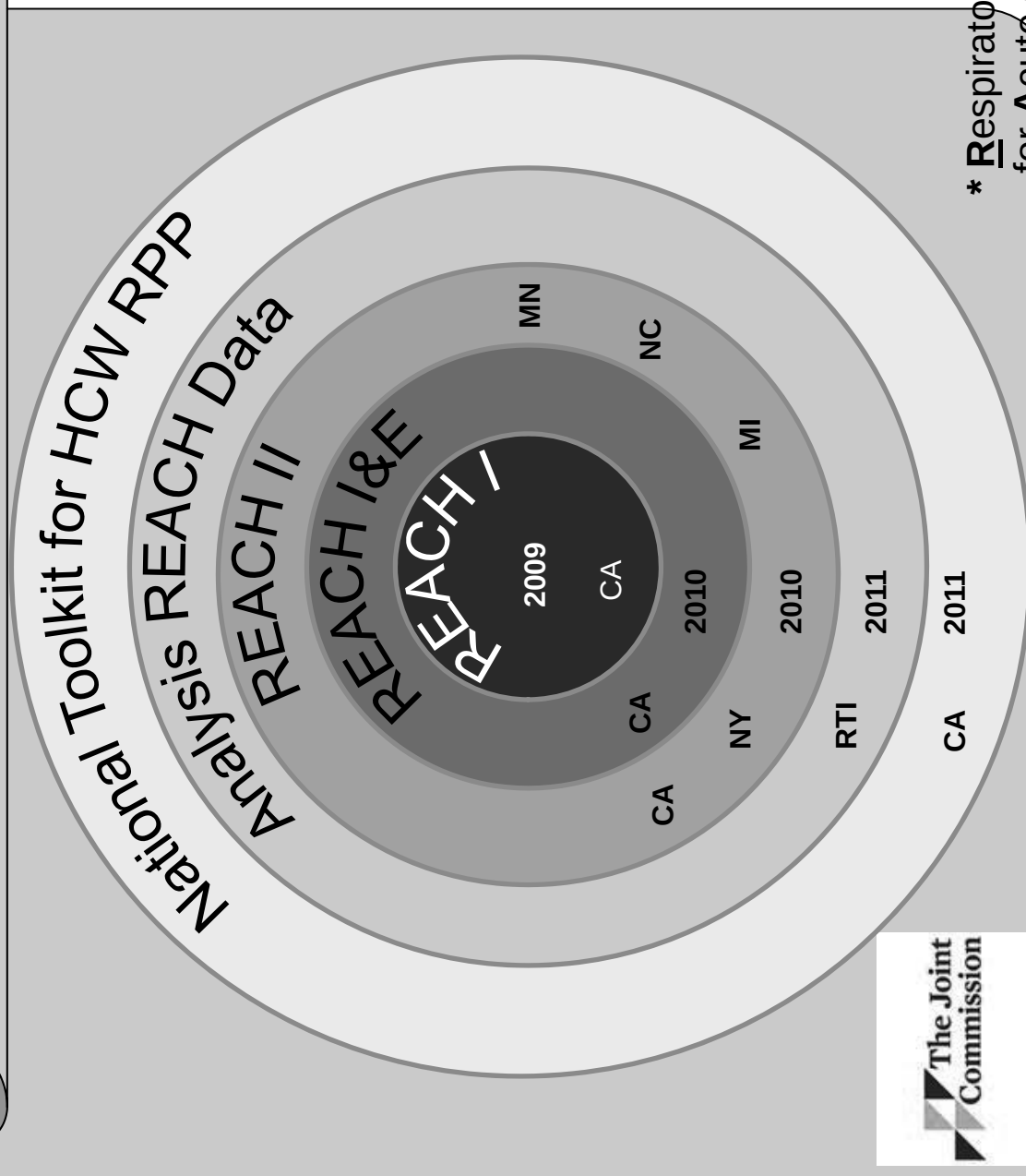
**HCWs are vulnerable!
Compliance is marginal!**



So there needs to be an improved focus on:

- **Infection Control Education**
- **Respiratory Protection Proper Use Practices**

RPP Best Practices Monograph



* Respirator Evaluation
for Acute Care Hospitals



Respiratory Use Evaluation in Acute Care California Hospitals “REACH I”

California Department of Public Health
&
NPPTL/NIOSH

Overview

Purpose of the Study

Assess the usage of respiratory protection for influenza exposure among healthcare workers.

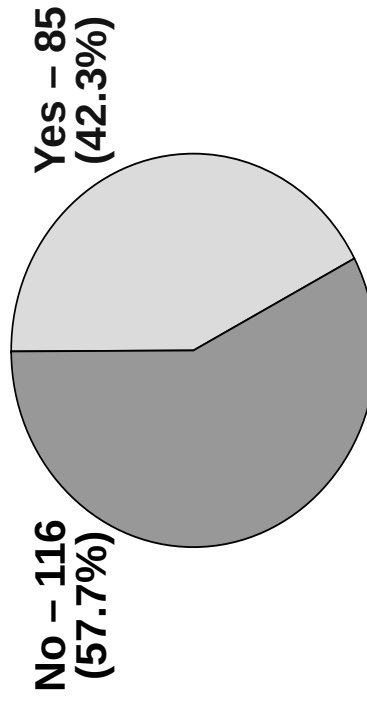
Study Methods

- Sixteen healthcare organizations participated in the study.
- Onsite surveys (15-21) and observational data collection methods were employed in each facility.
- 204 healthcare workers participated in the study from a variety of clinical specialties.

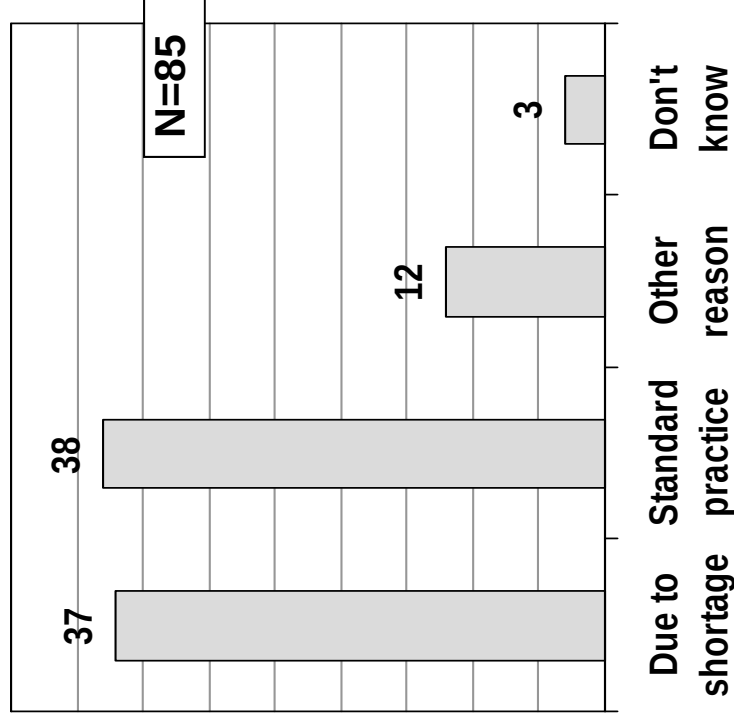
Approved by California and NIOSH IRBs as public health practice

Respirator Redonning

"Have you ever reused an N95 respirator when in close contact with patients who have confirmed or suspected H1N1?"

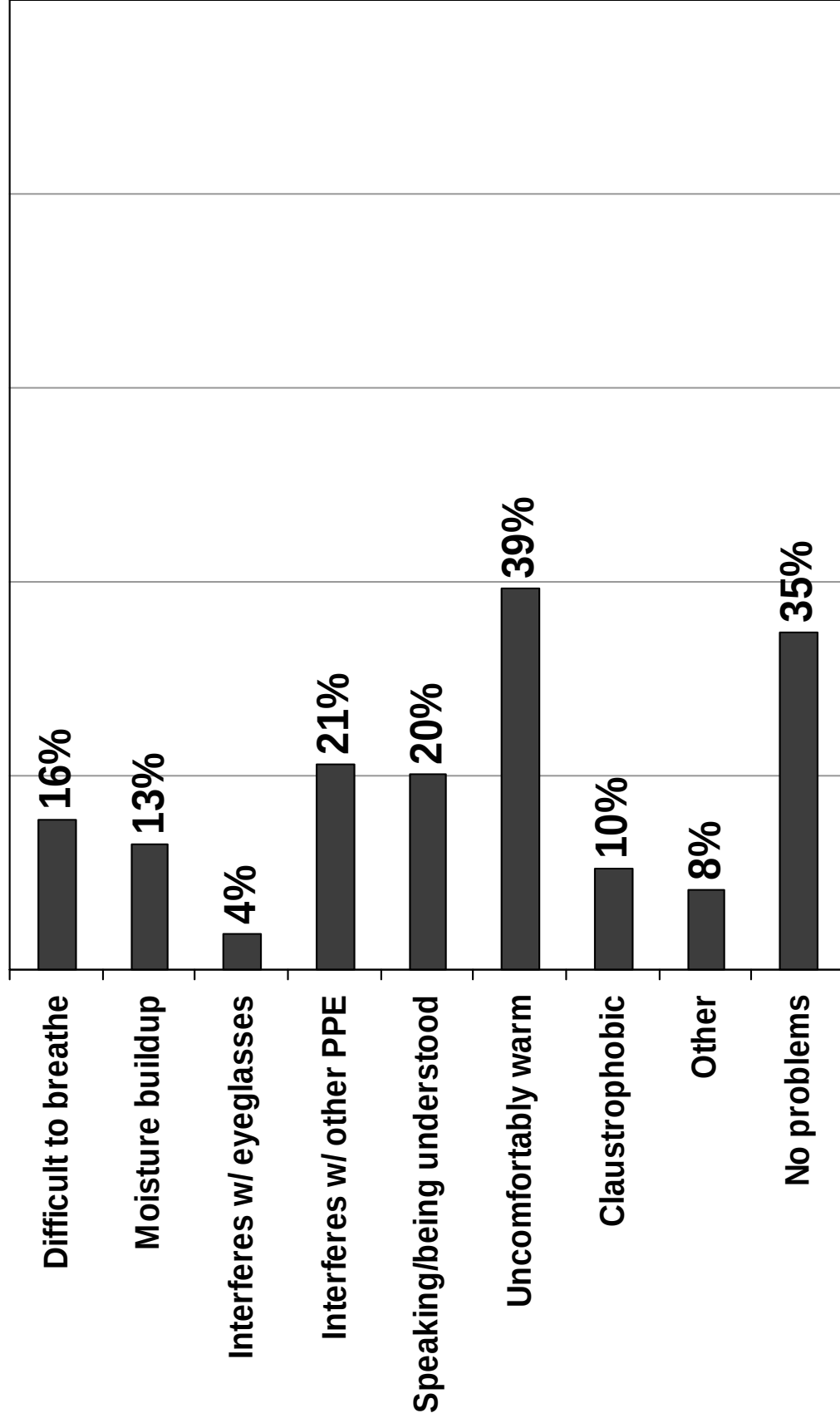


"If yes, why did you reuse the respirator?"



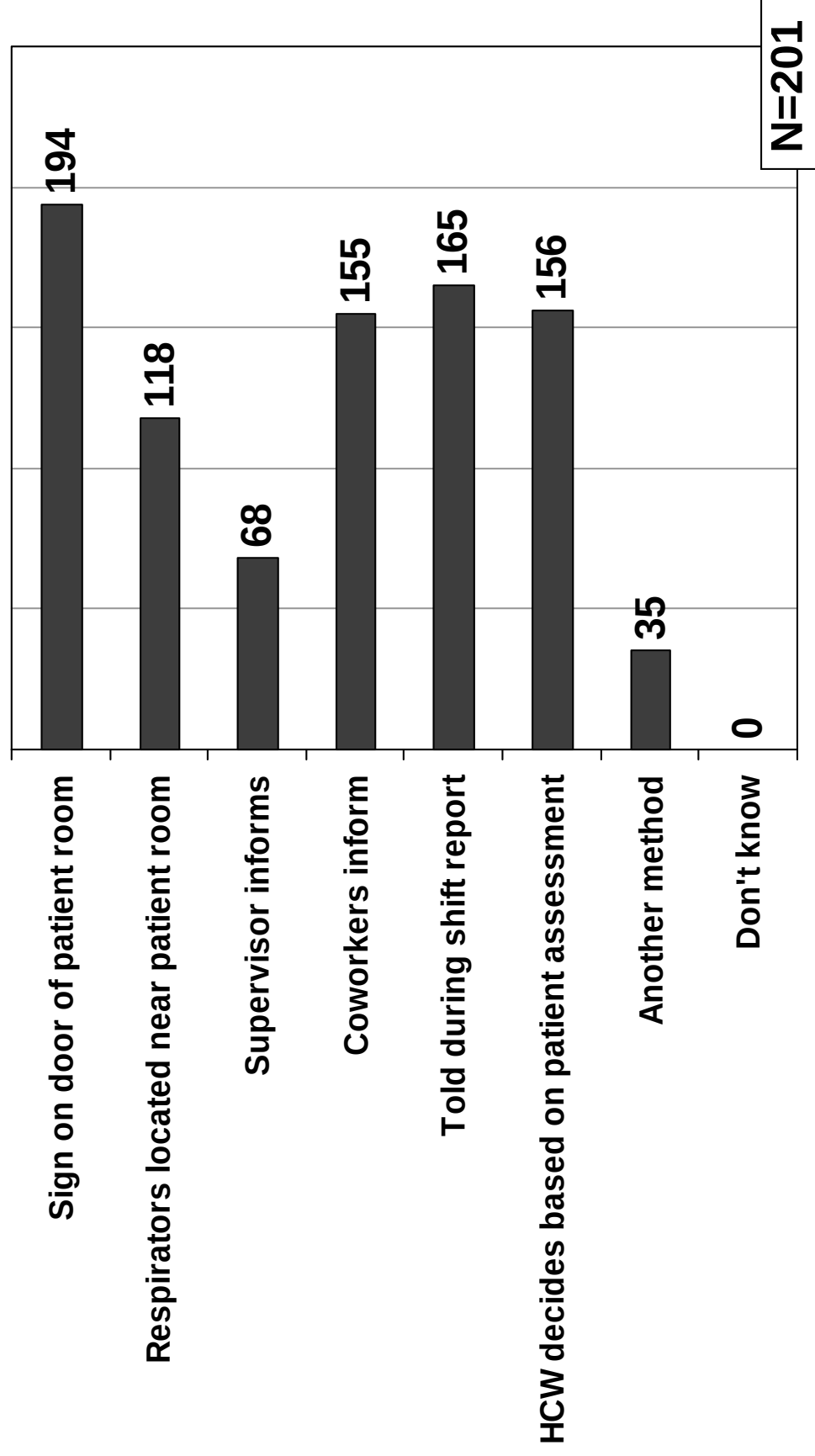
- Note - More than one response may have been selected by each respondent

Problems with N95 Respirators



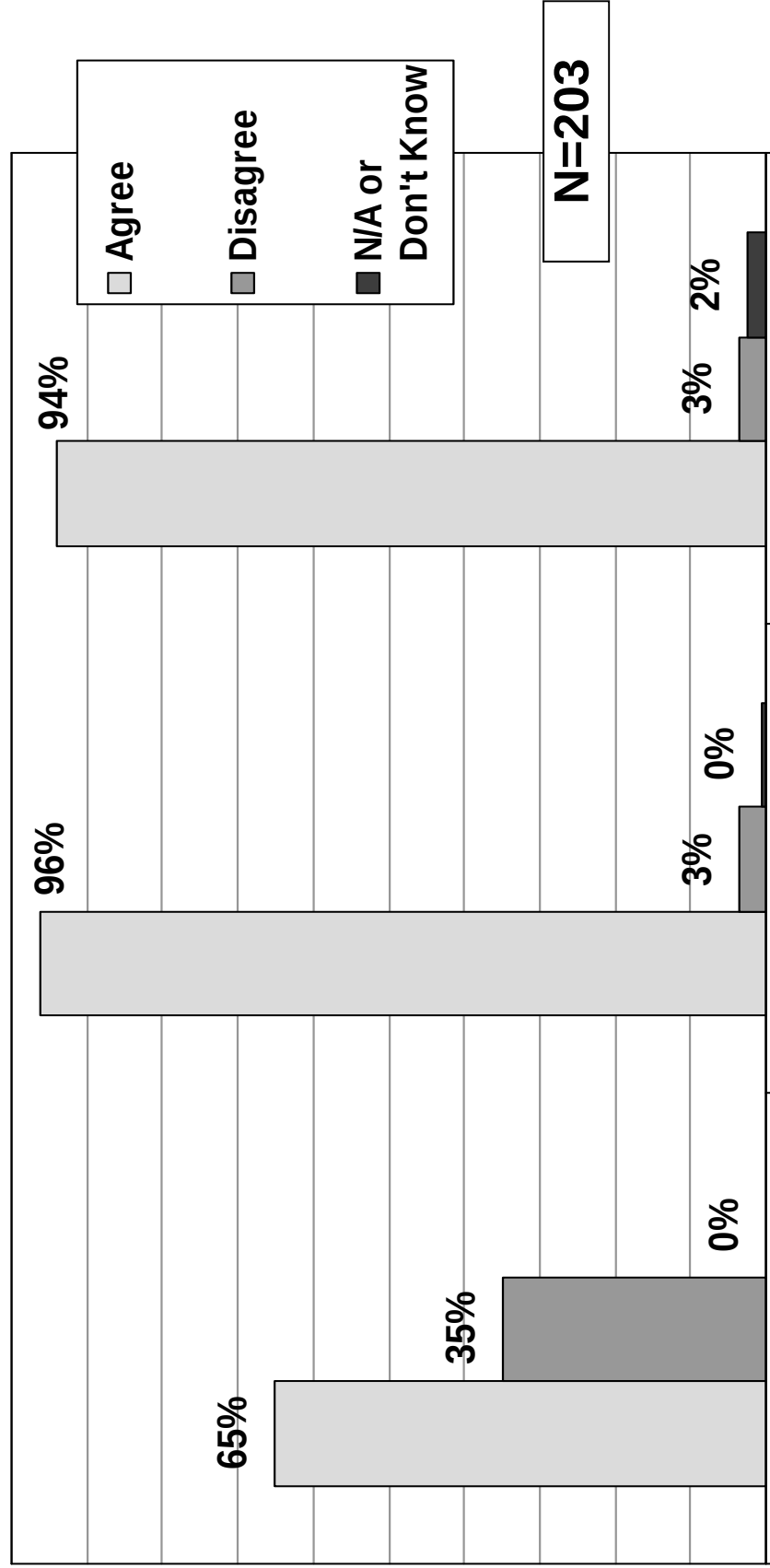
Note - More than one response may have been selected by each respondent

“How do you know that you need to wear a respirator?”



Note - More than one response may have been selected by each respondent

What do healthcare workers believe?



I am at high risk of becoming ill with influenza due to my work Wearing an N95 or better respirator can help protect me from on-the-job exposure to influenza N95 respirators are more effective at protecting me from influenza than surgical masks

Other findings

- **50% of the hospital managers reported that their facility had experienced a shortage of respirators between April 2009 and the survey period (January 20 - February 23, 2010).**
- **The observational data indicate improper use of respiratory protective equipment as evidenced by donning and doffing practices.**
 - Not performing a seal check
 - Improper strap placement
 - Touching the facepiece upon doffing

REACH II

Purpose: Evaluate hospitals' respiratory protection programs and respirator usage in five regions of the U.S.

Regions: North Carolina, Minnesota/Illinois,

New York, Michigan, California



Data Set Includes:

- 98 Hospitals
- 1500 hospital managers, unit managers & healthcare workers
- 300 demonstrations of donning & doffing

Synopsis

REACH II

- **Respiratory protection program plans exist on paper**
Response differences between HCWs, unit & hospital managers regarding operations of RPP.
- **Most HCWs recall fit test at hire with minimal updates.**
- **Fit-testing is the focus...ongoing preparedness training isn't (<15 minutes annually).**
- **HCWs are unclear about WHEN to use respiratory protection.**
- **HCWs are unclear about WHAT type of respirator should be used.**
- **HCWs are unclear about HOW to properly don and doff respirators (strap positions, seal checks, disposal).**

Targeted Education & Resources for Respiratory Protection Practice Compliance

REACH I & E

Compendium of :

- Tools
- Templates
- Online Resources



California Respirator Program Administrators go to-
<http://www.cdph.ca.gov/programs/ohb/Pages/RespToolkit.aspx>

National Toolkit



Respiratory Protection Monograph



The monograph is intended to:

- **stimulate greater awareness of the importance of an effective Respiratory Protection Program in a hospital and its potential benefits, and**
- **provide tools, resources & effective and innovative best practices to overcome challenges implementing respiratory protection programs.**

Quality Partnerships Enhance Worker Safety & Health



Thank you!

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Visit Us at: <http://www.cdc.gov/niosh/npptl/>

Disclaimer: The findings and conclusions in this presentation are those of the author and do not necessarily represent the views of The National Institute for Occupational Safety and Health.



NPPTL *Research to Practice
through Partnerships*

Respiratory Protection with PPE of Health Care Workers Project



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Influenza in the United States



- Annually 36,000 deaths in the United States
- Attacks disproportionately young, old, immunocompromised, those with chronic diseases
- Novel H1N1 generally affected young, old, pregnant women
- Transmission route debate:
 - Airborne
 - Droplet

Respiratory Protection/ PPE



- **Surgical masks**
 - ✦ Aerosol particle penetration 4 to 90%
 - ✦ Open on sides, top, bottom
- **Respirators (N95)**
 - ✦ Filter 95% to 99% of relevant aerosol particles
 - ✦ Cover mouth and nose
 - ✦ Fit-test required
- **PPE acts as barrier devices** (i.e., gloves, gowns, respirators, eye, and hearing protection)
 - ✦ **Respirators/PPE**
 - Difficulty in communication
 - Difficulty in breathing
 - Difficulty in maintaining tactile sensitivity (gloves)
 - Hot/uncomfortable

Health Care Workers at Risk



- 13.6 million in US
 - ✧ 35% hospital
 - ✧ 23% nursing/residential facilities
 - ✧ 17% physician offices

Project Purpose



Evaluate respiratory usage for respiratory infection among health care workers in a sample of North Carolina acute care hospitals

- Assessment of written respiratory protection program (RPP) policies
- Survey to assess knowledge and beliefs about respiratory protection among direct health care workers and managers
- Use of respiratory protection among health care workers
- Observation of respirator use

Sample



- 21 hospitals in North Carolina were selected by bed size in metropolitan and rural areas:
 - ✧ <150 beds
 - ✧ 151-300 beds
 - ✧ 301-500 beds
 - ✧ >500 beds
- Survey participants were selected on units if at-risk of respiratory infection.
- Of these participants, 69 were observed for respirator usage.

Instruments



- Healthcare Worker Interview
- Unit Manager Interview
- Hospital Manager Interview
- Respiratory Protection Observation Checklist
- Respiratory Protection Policy Assessment Checklist

Health Care Worker Instrument



- Assessed:
 - ✧ General information
 - ✧ Risk assessment and medical evaluation
 - ✧ Fit testing
 - ✧ RPP training
 - ✧ Program evaluation
 - ✧ Infection prevention
- Plus workplace safety checklist

Respiratory Observation Checklist



Assessed:

- ✧ Location of observation
- ✧ Availability of respirators and type
- ✧ Sinks or hand rub availability
- ✧ Waste receptacle
- ✧ Donning criteria
- ✧ Doffing criteria

Project Results



Demographic Information

Years of experience	Health Care Worker		Unit Manager		Hospital Manager	
	n	%	n	%	n	%
Less than 1 year	48	14.1	7	10.9	1	5.9
1-2 years	72	21.1	6	9.4	2	11.8
3-4 years	104	30.5	18	28.1	5	29.4
5 or more years	117	34.3	33	51.6	9	52.9

* Missing data excluded

**Responses > the sample size = More than one choice selected

Health Care Worker N=342* Unit Managers N=64* Hospital Managers N=17*

Project Results



Clinical Unit

	Health Care Worker N=378**		Unit Manager		Hospital Manager	
	n	%	n	%	n	%
ICU	103	27.2	16	22.2	N/A	N/A
ER	59	15.6	9	12.5	N/A	N/A
Pediatric	12	3.2	3	4.2	N/A	N/A
Med/Surg	132	34.9	15	20.8	N/A	N/A
Other	72	19.0	29	40.3	N/A	N/A

* Missing data excluded

**Responses > the sample size = More than one choice selected

Health Care Worker N=342*

Unit Managers N=64*

Hospital Managers N=17*

Project Results



Position Title for Health Care Worker

Registered Nurse	248	72.5%
Public Health Nurse	2	0.6%
Licensed Vocational Nurse	5	1.5%
Nursing Assistant	54	15.8%
Infection Prevention	1	0.3%
Technician-Radiology, Other	3	0.9%
Respiratory Therapy	20	5.8%
Therapist - Speech, Physical, Other	1	0.3%
Phlebotomist	1	0.3%
Receptionist/Clerk	2	0.6%
Housekeeping	1	0.3%
Other	4	1.2%

Project Results



Trigger elements for use of respiratory protection

	Health Care Worker Total Responses** 677		Unit Manager Total Responses ** 134		Hospital Manager Total Responses** 36	
	n	%	n	%	n	%
Patients signs & symptoms	181	26.7	33	24.6	8	22.2
Lab confirmation of disease	114	16.8	21	15.7	8	22.2
Physicians order	109	16.1	29	21.6	3	8.3
Sign on patient's room door	171	25.3	38	28.4	13	36.1
Verbally informed by co-worker	90	13.3	11	8.2	3	8.3
Don't Know	3	0.4	0	0.0	0	0.0
Other	9	1.3	2	1.5	1	2.8

**** Responses > the sample size = More than one choice selected**

Project Results



Medical evaluation and clearance before wearing respirator

	Health Care Worker Total Responses** 677		Unit Manager		Hospital Manager	
	n	%	n	%	n	%
Yes	300	89	55	87.3	17	100
No	24	7.1	6	9.5	0	0.0
Don't Know	12	3.6	2	3.2	-	-

**Responses > the sample size = More than one choice selected

Project Results



Health Care Workers (Only):
Receive seasonal influenza vaccine

Yes	271	79.5%
No, but I intend to get it	8	2.3%
No, and I do not intend to get it	58	17.0%
Don't Know	4	1.2%

Project Results



Written respiratory protection program at facility

	Health Care Worker		Unit Manager		Hospital Manager	
	n	%	n	%	n	%
Yes	261	77.0	61	95.3	17	100
No	3	0.9	1	1.6	0	0
Don't Know	75	22.1	2	3.1	-	-

Project Results



Health care worker or Unit manager input into respiratory protection program policy decisions

	Health Care Worker		Unit Manager		Hospital Manager	
	n	%	n	%	n	%
Yes	66	19.5	34	54	16	94.1
No	218	64.5	15	23.8	1	5.9
Don't Know	54	16.0	14	22.2	0	0.0

Project Results



Fit-tested for respiratory protection at hire

	Health Care Worker		Unit Manager		Hospital Manager	
	n	%	n	%	n	%
Yes	265	78.2	60	93.8	16	94.1
No	51	15	3	4.7	1	5.9
Don't Know	23	6.8	1	1.6	0	0.0

** Responses > the sample size = More than one choice selected

Project Results



How do you know which model(s) and size(s) of respirators you have been fit-tested for?

	Health Care Worker Total Responses** 378		Unit Manager		Hospital Manager	
	n	%	n	%	n	%
Informed verbally	91	24.1	9	14.1	2	11.8
Given written copy of results	152	40.2	34	53.1	5	29.4
Given a pocket card	115	30.4	16	25.0	8	47.0
Don't Know	9	2.4	3	4.7	1	5.9
Other	11	2.9	2	3.1	1	5.9

**** Responses > the sample size = More than one choice selected**

Project Results



Problems for Health Care Workers when wearing N95

Total Responses**	472
I find it difficult to breath	94 19.9%
I'm bothered by moisture buildup	82 17.4%
It interferes with the wear of other PPE	21 4.4%
It interferes with the wear of my glasses	52 11.0%
I find it difficult to speak/be understood	58 12.3%
I find it uncomfortably warm	120 25.4%
I am claustrophobic	45 9.5%

**** Responses > the sample size = More than one choice selected**

Project Results



If unsuccessful fit-test

	Health Care Worker		Unit Manager		Hospital Manager	
	n	%	n	%	n	%
Given a PAPR	179	53.4	56	87.5	16	94.1
Reassigned to a lower risk job	7	2.1	0	0.0	0	0.0
Don't Know	117	34.9	2	3.1	-	-
Other	32	9.6	6	9.4	1	5.9

Project Results



Training about respiratory protection

	Health Care Worker		Unit Manager		Hospital Manager	
	n	%	n	%	n	%
Yes	32 0	94.4	64	100	16	100
No	12	3.5	0	0.0	0	0.0
Don't Know	7	2.1	-	-	-	-

Project Results



When is training provided

	Health Care Worker		Unit Manager		Hospital Manager	
	n	%	n	%	n	%
At hire only	20	5.9	7	10.9	1	6.7
At hire, and then annually	254	74.5	52	81.3	12	80.0
At hire, then as required by MD	8	2.4	0	0.0	1	6.7
No requirements	10	2.9	1	1.6	0	0.0
Don't Know	40	11.7	4	6.3	0	0.0
Other	9	2.6	-	-	1	6.7

Project Results



Length of training about respiratory protection

	Health Care Worker		Unit Manager		Hospital Manager	
	n	%	n	%	n	%
1-15 minutes	130	38.6	30	46.9	10	58.8
16-30 minutes	119	35.3	21	32.8	5	29.4
31-60 minutes	24	7.1	2	3.1	0	0.0
More than 60 minutes	2	0.6	1	1.6	0	0.0
Don't Know	61	18.1	10	15.6	2	11.8
Other	1	0.3	-	-	-	-

*Missing data are excluded

Project Results



Can direct health care workers wear a respirator without training

	Health Care Worker		Unit Manager		Hospital Manager	
	n	%	n	%	n	%
Yes	14	4.1	1	1.6	0	0.0
No	286	84.1	60	93.8	17	100
Don't Know	40	11.8	3	4.7	-	-

*Missing data are excluded

Project Results



Is worker input solicited during program evaluation

	Health Care Worker		Unit Manager		Hospital Manager	
	n	%	n	%	n	%
Yes	91	27.0	12	30.8	4	57.1
No	171	50.7	9	23.1	1	14.3
Don't Know	75	22.3	18	46.2	2	28.6

Project Results



Is there observation about correct wearing of respirators by supervisor

	Health Care Worker		Unit Manager		Hospital Manager	
	n	%	n	%	n	%
Yes	158	46.7	24	60.0	5	71.4
No	111	32.8	5	12.5	1	14.3
Don't Know	69	20.4	11	27.5	1	14.3

Project Results



Are respirators properly maintained

	Health Care Worker		Unit Manager		Hospital Manager	
	n	%	n	%	n	%
Yes	153	45.3	17	42.5	5	71.4
No	6	1.8	9	22.5	1	14.3
Don't Know	179	53.0	14	35.0	1	14.3

Project Results



Minimum level of respiratory protection required to use when in close contact with a patient who has a suspected or confirmed infectious disease requiring airborne precautions, such as measles

	Health Care Worker		Unit Manager		Hospital Manager	
	n	%	n	%	n	%
None	2	0.6	0	0.0	0	0.0
Surgical Mask	55	16.1	16	25.4	3	17.6
N-95 (disposable) respirator	250	73.1	44	69.8	13	76.5
Elastomeric half-face N-95 respirator	10	2.9	2	3.2	1	5.9
Powered Air Purifying Respirator (PAPR)	4	1.2	0	0.0	0	0.0
Don't Know	19	5.6	1	1.6	0	0.0
Other	2	0.6	-	-	-	-

Project Results



Minimum level of respiratory protection required to use when performing aerosol-generating procedures on a patient who has a suspected or confirmed infectious disease requiring airborne precautions, such as measles

	Health Care Worker		Unit Manager		Hospital Manager	
	n	%	n	%	n	%
None	2	0.6	0	0.0	0	0.0
Surgical Mask	27	8.0	7	11.1	1	5.9
N-95 (disposable) respirator	251	74.0	47	74.6	14	82.4
Elastomeric half-face N-95 respirator	6	1.8	3	4.8	1	5.9
Powered Air Purifying Respirator (PAPR)	9	2.7	2	3.2	1	5.9
Don't Know	43	12.7	4	6.3	0	0.0
Other	1	0.3	-	-	-	-

Project Results



Minimum level of respiratory protection required to use when in close contact with patients who have suspected or confirmed seasonal influenza

	Health Care Worker		Unit Manager		Hospital Manager	
	n	%	n	%	n	%
None	10	3.0	1	1.6	0	0.0
Surgical Mask	241	71.5	46	75.4	12	70.6
N-95 (disposable) respirator	75	22.3	10	16.4	4	23.5
Elastomeric half-face N-95 respirator	1	0.3	2	3.3	0	0.0
Powered Air Purifying Respirator (PAPR)	1	0.3	1	1.6	0	0.0
Don't Know	6	1.8	1	1.6	0	0.0
Other	-	-	-	-	1	5.9

Project Results



Minimum level of respiratory protection you are required to use when performing aerosol-generating procedures on a patient who has seasonal influenza

	Health Care Worker		Unit Manager		Hospital Manager	
	n	%	n	%	n	%
None	3	0.9	1	1.6	1	6.3
Surgical Mask	153	45.4	24	37.5	10	62.5
N-95 (disposable) respirator	135	40.1	32	50.0	5	31.2
Elastomeric half-face N-95 respirator	3	0.9	0	0.0	0	0.0
Powered Air Purifying Respirator (PAPR)	3	0.9	0	0.0	0	0.0
Don't Know	37	11.0	4	6.3	0	0.0
Other	3	0.9	1	1.6	-	-

Project Results



Written policy for redonning (reuse) of respirators at facility

	Health Care Worker		Unit Manager		Hospital Manager	
	n	%	n	%	n	%
Yes	145	43.2	32	50.8	7	43.8
No	58	17.3	17	27.0	8	50.0
Don't Know	133	39.6	14	22.2	1	6.3

Project Results



How are respirators stored between doffing and redonning?

	Health Care Worker		Unit Manager		Hospital Manager	
	n	%	n	%	n	%
In a plastic bag	35	24.5	13	44.8	2	22.2
In a paper (breathable) bag	28	19.6	9	31.0	4	44.4
In a rigid plastic box	7	4.9	0	0.0	1	11.1
Carried by the employee	5	3.5	0	0.0	0	0.0
Hangs in designated area	29	20.3	5	17.2	0	0.0
Don't Know	29	20.3	1	3.4	2	22.2
Other	10	7.0	0	0.0	0	0.0

Respiratory Observation Results of Health Care Workers (cont)

N=69*

Type of healthcare worker observed

	n	%
Physician/Physician Assistant or Nurse Practitioner	0	0
Registered Nurse/Public Health Nurse	50	72.4
Licensed Vocational Nurse/Nursing Assistant or Patient Care Assistant	10	14.4
Infection Preventionist	2	2.9
Respiratory Therapist	2	2.9
Environmental Services or Housekeeping	3	4.3
Other	2	2.9

*Sub-sample of survey participants

Respiratory Observation Results of Health Care Workers (cont)

Respirators available in work area

	n	%
Yes	68	98.6
No	1	1.4

Type of respirator

	n	%
N95	67	97.1
PAPR	1	1.4
Elastomeric	1	1.4

Respiratory Observation Results of Health Care Workers (cont)

Proper hand hygiene performed before use

	n	%
Yes	37	53.6
No	32	46.4

Respirator positioned correctly on HCWs face

	n	%
Yes	61	88.4
No	8	11.6

Respiratory Observation Results of Health Care Workers (cont)

Is a sink or hand rub available?

	n	%
Yes	15	21.7
No	54	78.3

Is a waste receptacle available?

	n	%
Yes	59	85.5
No	10	14.5

Respiratory Observation Results of Health Care Workers (cont)

Facial hair under the seal

	n	%
Yes	3	7.5
No	37	92.5
N/A	29	-

Respirator straps correctly placed *

	n	%
Yes	45	66.2
No	23	33.8

*Missing data are excluded

Respiratory Observation Results of Health Care Workers (cont)

Nose clips used properly

	n	%
Yes	62	89.9
No	7	10.1

User seal check performed

	n	%
Yes	19	27.5
No	50	72.5

Respiratory Observation Results of Health Care Workers (cont)

Respirator removed properly (doffing)

	n	%
Yes	43	62.3
No	26	37.7

Respirator disposed of after use

	n	%
Yes	47	68.1
No	22	31.9

Respiratory Observation Results of Health Care Workers (cont)

Was there proper hand hygiene after use?

	n	%
Yes	47	68.1
No	22	31.9

Maintenance/Storage

	n	%
Yes	48	69.6
No	21	30.4

Respiratory Protection Written Policy

N=21



Presence of Written RPP: To provide a clear policy and specific procedures for the use of respirators in protecting employees from respiratory hazards	n	%
Yes:	17	81.0
No:	3	14.3
Partial:	1	4.8

Program Administrator: To assign responsibility for ensuring full implementation and evaluation of the written program to suitably trained workers	n	%
Yes:	15	71.4
No:	5	23.8
Partial:	1	4.8

Respiratory Protection Written Policy

N=21



Medical Evaluation: To ensure that employees are able to wear respirators safely		
	n	%
Yes:	21	100
No:	0	0
Partial:	0	0

Fit-testing: To choose the brand, model, and size of respirator that provides the best fit for each individual employee and to provide an opportunity to review proper donning and doffing procedures		
	n	%
Yes:	18	85.7
No:	0	0.0
Partial:	3	14.3

Respiratory Protection Written Policy



Recordkeeping: To maintain a record of individual medical evaluations and fit tests and to ensure the availability of the written program	n	%
Yes:	19	90.5
No:	1	4.8
Partial:	1	4.8

Are individual medical records separate from personnel records?(1 missing)	n	%
Yes:	19	95.0
No:	1	5.0

Respiratory Protection Written Policy



Training and Information: To ensure that employees understand the facility's written program and the purpose and limitations of respirators, and that they are trained in the specific procedures for proper use and maintenance	n	%
Yes:	11	52.4
No:	6	28.6
Partial:	4	19.0

Respirator Selection: To determine which types of NIOSH-approved respirators will be required for each job or task based on an evaluation of respiratory hazards	n	%
Yes:	13	61.9
No:	8	38.1
Partial:	0	0.0

Respiratory Protection Written Policy



Use of Respirators: To provide clear, written policies and procedures for proper use of respirators by employees		
Yes:	n	%
	9	42.9
No:	10	47.6
Partial:	2	9.5
Maintenance and Care of Respirators: To provide clear, written procedures for storage, care, and maintenance of respirators		
Yes:	n	%
	13	61.9
No:	6	28.6
Partial:	2	9.5
Program Evaluation: To ensure that the written program is being implemented and that it continues to be effective		
Yes:	n	%
	10	47.6
No:	8	38.1
Partial:	3	14.3

RPP Training/Information Present

N=19



Respirator	n	%
Why the respirator is necessary	17	89.5
How improper fit, use, or maintenance can compromise its protective effect	13	68.4
Limitations and capabilities of the respirator	5	26.3
Effective use in emergency situation	13	68.4
How to inspect, use, and check the seals	14	73.7
How to don and doff	8	42.1
Maintenance and storage	12	63.2
Recognition of medical signs and symptoms that may limit or prevent effective use	9	47.4
Training provided prior to use	19	100
Retraining annually	15	78.9

Recommendations

- **Complete policy review**
- **More thorough training**
 - ✧ **Donning/Doffing**
 - ✧ **Seal checks**
 - ✧ **Return demonstrations**
- **Better understanding of influenza transmission/prevention strategies**
- **Program effectiveness evaluation**
- **Communication**



Thank you

Integration of Respiratory Protection into Practice Among Health Care Workers

Focus Groups

Focus Group Purposes

- Purpose is to gather data that can be used to
 - Improve respiratory protection education and training opportunities for all health care workers (HCW)
 - Provide input into proposed competencies for respiratory protection for HCW

Ground Rules for Focus Group

- Names will not be taken
- Each person will have opportunity to speak
- One person will speak at a time
- Recording will be made so that comments can be correctly documented
- Each session will last 1 – 1 ½ hours
- Comments will be used as aggregate data

Focus Group Questions

- Describe your respiratory protection program (RPP)
- Describe how you get your training and education in the RPP
- How do you take care of your respirators

Focus Group Questions (continued)

- Do you have recommendations for improvements in your RPP
- What knowledge and skills do you think are important for people to have who need to use respirators

Focus Group Invitees

- HCW from each department
 - ✓ ER
 - ✓ Peds
 - ✓ Infection control
 - ✓ Respiratory therapy
 - ✓ OHN
 - ✓ Nursing assistants
 - ✓ Lab workers

When and How Often

- How often
 - Would like to have one or two focus groups at your facility
 - One for day shift (time convenient for you) and one for evening shift (around 3 or 4 PM)
- Number of Participants in each group
 - About 8 participants
- When
 - Between June 19 and July 18th
 - On either a Tuesday, Wednesday, or Thursday

Contact Information for Setting up Focus Group Meetings

Judy Ostendorf

judyostendorf@pmi-rtp.com

Respiratory Protection Program Pretest

Please circle correct letter response and write letter response on score sheet

1. An N-95 respirator should not be used to protect against which of the following respiratory hazards.

- a) TB
- b) Pesticides
- c) Measles
- d) Severe Acute Respiratory Syndrome (SARS)

2. A medical evaluation must be done:

- a) Before the initial respirator fit test
- b) If an employee reports medical signs or symptoms related to ability to use a respirator
- c) If there is a change in workplace conditions that may increase the physiological burden on the employee
- d) All of the above

3. The purpose of the fit test is to:

- a) Determine whether an N95 or PAPR should be used
- b) Make sure the N-95 respirator provides a tight fitting face seal to prevent unfiltered air (particles) from getting inside the respirator
- c) To protect the patient from a health care worker with a respiratory infection
- d) Learn about respirator reuse procedure

4. Fit testing is required:

- a) Annually
- b) Every three years
- c) Whenever a different model or size of respirator is used
- d) a and c

5. Respirator users should check the seal of the respirator:

- a) Only before being fit tested
- b) Every time you put on a respirator
- c) If the respirator feels loose
- d) Only after fit testing

6. Unused respirators should be stored to protect them from which of the following:

- a) Sunlight and extreme temperatures

- b) Excessive moisture and damage
- c) Deformation of the face piece and exhalation valve
- d) All of the above

7. You must complete training about the respiratory protection program at least:

- a) Annually
- b) One time during your employment
- c) Every 3 years
- d) When you start a new position

8. Which of the following procedures are considered high hazard for exposure to aerosol transmissible pathogens:

- a) Sputum induction, bronchoscopy
- b) Pulmonary function testing , aerosolized medication administration
- c) Bronchoscopy, O₂ administration
- d) a and b

9. Who needs to wear respirator:

Employees who:

- a) Provide general home health care
- b) Change wound dressing
- c) Repair equipment that may contain aerosolized pathogens
- d) Work in the operating room

Respiratory Protection Score Sheet

Please write in letter response

Pretest

1)

2)

3)

4)

5)

6)

7)

8)

9)

Posttest

1)

2)

3)

4)

5)

6)

7)

8)

9)

Practice Champions Observation Checklist/ Log Template

	A. Date/Location (e.g., Patient Room):	B. Briefly describe incident or observation, or guidance request (e.g., not wearing respirator, improper donning/doffing):	C. Resolution (briefly describe action / guidance / resources provided):	D. Referral needed (e.g., Refit test) (briefly describe): To whom? For what?	E. Follow-up provided (briefly describe / comments):
1.					
2					
3					

Practice Champion Checklist /Log Data

HOSPITAL A				
A. Date/Location (e.g., Patient Room):	B. Briefly describe incident or observation, or guidance request (e.g., not wearing respirator, improper donning/doffing):	C. Resolution (briefly describe action / guidance / resources provided):	D. Referral needed (e.g., ReFit-test) (briefly describe): To whom? For what?	E. Follow-up provided (briefly describe / comments):
1 6/18/2013 Free standing ED	Overview of Fit-testing. Guidelines to include donning/doffing and review of when to be re-tested. Observed staff entering room prior to completing proper fit of respirator.	Explained that weight loss/gain in person needs to be re-tested. Explained/discussed that staff should always perform fit check prior to entering room.	ED Staff. Discussion with department Fit-testers to educate on importance of proper use.	None at this time. Re-evaluated Staff after education (7/15/13).
3 7/25/2013 ED	Observed staff in ED. Discussed the need to insure patient is placed on precautions early to protect all staff.	Discussion that it is best practice to place patients on respiratory precautions early and that we can always cancel if needed.	ED Staff and providers.	Re-evaluated staff.
4 8/1/2013 Registration Staff in ED	Observed Registration Staff entering room prior to applying respirator.	Discussed importance of applying respirator prior to entering room.	Discussion with Dept. Fitter and Manager.	Education of Staff.
5 8-8 to 8-15-13 ICU/PCU	Attended Staff meetings to observe donning/doffing.	Re-educated as needed on proper technique on Donning/Doffing.	ICU/PCU Staff.	
6 8/20 to 8/30/13 Medical units	Attended Staff meeting to observe donning/doffing.	Re-educated as needed.	Medical/Pediatrics Staff.	
7 6/28/13 Med-Surg Ortho floor T.D, NA II	Observed placement (N-95 duckbill). Proper placement except for bottom string placed above hair. No fit check done.	Education performed on string placement and doing fit check of mask for air escape.	No.	N/A
8 6/28/13 Med-Surg Ortho floor DC, RN	Demonstrated placement of mask. Only use one finger to adjust nosepiece.	Education performed on using both hands to adjust nosepiece properly.	No.	No.

Practice Champion Checklist / Log Data

A. Date/Location (e.g., Patient Room):	B. Briefly describe incident or observation, or guidance request (e.g., not wearing respirator, improper donning/doffing):	C. Resolution (briefly describe action / guidance / resources provided):	D. Referral needed (e.g., ReFit-test) (briefly describe): To whom? For what?	E. Follow-up provided (briefly describe / comments):
9	6/28/13 Med-Surg Ortho BH, NA II	Did not know her mask size. Straps placed appropriately but didn't check for seal or adjust nose appropriately.	Contact manager to get correct mask size. Educated on nose adjustment and seal check.	No.
10	6/28/13 J.J Med Surg	Does not know what mask to wear. Never followed up with Employee Health for initial fitting.	Employee Health Nurse and contact information given for initial Fit-testing.	Manager contacted to make sure Fit-testing was scheduled.
11	6/28/13 C.H Med Surg	Placed mask on properly. Did not press nose with both sides and did not do seal check.	Proper placement. Nose pinch and seal check reviewed and return demonstration done.	No.
12	7/1/13 E. NA I Emergency Dept.	Not sure of mask size. 1. Bottom string not placed under hair. 2. Pinched with one finger. 3. Did not do seal check.	Instructed on proper use of mask and proper adjustment of nose check and seal check.	Referred to Employee Health to find out mask size and type from last Fit-test.
13	7/1/13 RN Emergency Dept.	Knew correct mask size and type. Bottom string over ponytail. Did not do seal check.	Education on proper placement of strings of mask and seal check.	No.
14	7/1/13 RN Emergency Dept.	Knew mask size and type. Thought strings were supposed to be criss-crossed for proper seal.	education on proper placement of strings for mask.	No.
15	7/1/13 RN Med Surg Tele	Mask placed on properly. Did not pinch nose piece properly. Needs to remember to do seal check.	Education on nose adjustment and performing seal check before entering patient's room.	
16	7/4/13 RN Cardiac Tele	Mask applied correctly. Did not do seal check and did not pinch nose piece with 2 fingers.	Educated on proper seal check for mask and using both hands to press nose for seal.	No. This was a R/O TB room

Practice Champion Checklist /Log Data

A. Date/Location (e.g., Patient Room):	B. Briefly describe incident or observation, or guidance request (e.g., not wearing respirator, improper donning/doffing):	C. Resolution (briefly describe action / guidance / resources provided):	D. Referral needed (e.g., ReFit-test) (briefly describe): To whom? For what?	E. Follow-up provided (briefly describe / comments):
17 7/4/13 RN Cardiac Tele	Mask placed but bands were crossed.	Educated on placement of mask and bands. Reminded proper seal check.	No.	Patient - R/O TB
18 7/12/2013 RN Cardiac Tele	Mask placed. Upper band needed to be higher and lower band on neck. Needs to do seal check.	Education on proper fit and adjustment of nose area and proper seal check before entering patient's room.		Patient positive for TB. TB isolation in effect.
19 7/12/13 RN Cardiac Tele	Mask placed properly. Proper pinch of nose. Did not do seal check.	Education on seal check before entering room.	No.	TB isolation room.
20 7/15/13 RN Med Surg	Mask placed but bottom band not in right position. Did not nose pinch correctly. Did not do seal check.	Complete education on proper placement - seal check and nose adjustment done.	No.	Nurse did return demonstration.
21 7/15/13 RN Cardiac Tele	Mask placed properly. Did not pinch nose correctly.	Education on nose adjustment completed.	No.	
22 7/30/13 RN ED	Mask placed properly except for bottom band over hair. Did not do seal check.	Education on proper placement of mask given. Seal check reviewed.	No.	Nurse did return demonstration.
23 7/30/13 NA I ED	Mask placed properly except top string needed to be higher.	Proper placement of mask strings reviewed and demonstrated.	No.	
24 8/28/13 RN Med -Surg TB Isolation	Proper placement needed to do seal check and proper nose pinch adjustment.	Education on proper seal check and adjustment of nosepiece.	No.	
25 8/27/13 NA I TB Isolation	Proper placement but seal check not done. Drew on the mask a colored a smiley face with teeth to cheer up patient.	Eucation on seal check completed. Also explained that using marker to draw on masks makes mask ineffective. Once wet, mask will not protect properly.	No.	

Practice Champion Checklist /Log Data

	A. Date/Location (e.g., Patient Room):	B. Briefly describe incident or observation, or guidance request (e.g., not wearing respirator, improper donning/doffing):	C. Resolution (briefly describe action / guidance / resources provided):	D. Referral needed (e.g., ReFit-test) (briefly describe): To whom? For what?	E. Follow-up provided (briefly describe / comments):
26	6/19/13 RN Main/STICU	Did not take hair out.	Educated to take hair out.		
27	6/19/13 RN Main/Teammate Health	Correct.			
28	6/19/13 RN Annex Onsite	Correct.			
29	6/19/13 Security Main/Security	Correct.			
30	6/19/13 RN Main/ED	Correct.			
31	6/19/13 RN Main/ED Float Pool	Crossed Straps.	Educated on donning correctly.		
32	6/19/13 RN Main/ED	Diagnostics - Crossed straps.	Educated on donning correctly.		
33	6/19/13 Guest Services Main/Guest Services	Both straps on top of ears. Mashed nosepiece.	Educated on donning correctly.		
34	6/26/13 CNA Main/ED	Correct.			
35	6/26/13 Phlebotomist Main/Phlebot.	Both straps behind ears. Did not know how to adjust.	Educated on donning correctly.		

Practice Champion Checklist /Log Data

	A. Date/Location (e.g., Patient Room):	B. Briefly describe incident or observation, or guidance request (e.g., not wearing respirator, improper donning/doffing):	C. Resolution (briefly describe action / guidance / resources provided):	D. Referral needed (e.g., ReFit-test) (briefly describe): To whom? For what?	E. Follow-up provided (briefly describe / comments):
36	6/26/13 Phlebotomist Main/Phlebot.	Correct.			
37	6/26/13 MD Main	Both straps together.	Educated on donning correctly.		
38	7/10/13 NA II Main/10 Tower	Did not do proper fit check.	Educated on the spot.		
39	7/10/13 Airport Center Onsite Care	Did not complete fit check.	Educated on the spot.		
40	7/10/13 Student Main	Correct.			
41	7/10/13 NA I 7North	Hair not taken out under bottom strap. Top strap not placed on crown of head.	Educated on the spot.		
42	7/10/13 RN Urgent Care	Correct.			
43	7/10/13 RN Main/ED	Correct.			
44	7/10/13 MOA Family Practice Dr. Office	No Fit Check.	One-on-one teaching to do fit check.		
45	7/10/13 MD Family Medicine	Correct.			
46	7/31/13 Registrar Main/Registrar	Correct.			

Practice Champion Checklist /Log Data

	A. Date/Location (e.g., Patient Room):	B. Briefly describe incident or observation, or guidance request (e.g., not wearing respirator, improper donning/doffing):	C. Resolution (briefly describe action / guidance / resources provided):	D. Referral needed (e.g., ReFit-test) (briefly describe): To whom? For what?	E. Follow-up provided (briefly describe / comments):
47	7/31/13 CNA Health @ Home	Correct.			
48	7/31/13 MD Onsite	Correct.			
49	7/31/13 CNA Main/3T	Correct.			
50	ER	Improper donning/wearing.	Guidance on - 1. strap placement-top straps on top; 2. Fit check-means they did not attempt to check mask at all.	None.	
51	ER	Improper donning/wearing.	Guidance on - fit check.	None.	
52	ER	Improper donning/wearing.	Guidance on - fit check.	Mask not tight (male with hair on face), needs repeat Fit-test. Referred to Employee Health.	
53	Radiology	Improper donning/wearing.	Guidance on - fit checks, strap placement.	None.	
54	Radiology	Improper donning/wearing.	Guidance on - fit check, donning straps (placing straps under the hand before donning the mask).	None.	
55	Radiology	Improper donning/wearing.	Guidance on - fit check.	None.	
56	Radiology	Improper donning/wearing.	Guidance on - fit check and nosepiece fitting (using 2 hands while fitting the nosepiece).	None.	
57	Radiology	Improper donning.	Guidance on - donning straps.	None.	
58	ER	Improper donning.	Guidance on - fit of nosepiece.	None.	
59	ER	Improper donning/wearing.	Guidance on - strap placement.	None.	

Practice Champion Checklist /Log Data

A. Date/Location (e.g., Patient Room):	B. Briefly describe incident or observation, or guidance request (e.g., not wearing respirator, improper donning/doffing):	C. Resolution (briefly describe action / guidance / resources provided):	D. Referral needed (e.g., ReFit-test) (briefly describe): To whom? For what?	E. Follow-up provided (briefly describe / comments):
60	ER Improper donning/wearing.	Guidance on - strap placement.	None.	
61	ER Improper donning/wearing.	Guidance on - fit check and donning straps.	None.	
62	ER Improper donning/wearing.	Guidance on - fit check.	None.	
63	ER Improper donning.	Guidance on - fit check.	None.	
64	ER Improper donning/wearing.	Guidance on - donning of straps, strap placement.	None.	
65	ER Improper donning/wearing.	Guidance on - fit check, strap placement.	None.	
66	ER Improper donning/wearing.	Guidance on - fit of nosepiece and fit check.	None.	
67	ER Improper donning/wearing.	Guidance on - fit check.	None.	
68	ER Improper donning/wearing.	Guidance on - fit check.	None.	
69	ER Improper donning/wearing.	Guidance on - fit check.	None.	
70	ER Improper donning/wearing.	Guidance on - strap placement, fit check.	None.	
71	ER Improper donning/wearing.	Guidance on - fit check.	None.	
72	ER Improper donning/wearing.	Guidance on - fit check.	None.	
73	ER Improper donning/wearing.	Guidance on - fit check.	None.	
74	ER Improper donning/wearing.	Guidance on - fit check.	None.	
75	ER Improper donning/wearing.	Guidance on - fit of nosepiece.	None.	
76	ER Improper donning/wearing.	Guidance on - fit check.	None.	
77	ER Improper donning/wearing.	Guidance on - fit check.	None.	
78	Security Improper donning/wearing.	Guidance on - strap placement, fit check, nosepiece fitting.	None.	
79	Security Improper donning/wearing.	Guidance on - fit check.	None.	
80	ER Improper donning/wearing.	Guidance on - fit check.	None.	
81	ER Improper donning/wearing.	Guidance on - fit check.	None.	
82	ER Improper donning/wearing.	Guidance on - fit check.	None.	

Practice Champion Checklist /Log Data

A. Date/Location (e.g., Patient Room):	B. Briefly describe incident or observation, or guidance request (e.g., not wearing respirator, improper donning/doffing):	C. Resolution (briefly describe action / guidance / resources provided):	D. Referral needed (e.g., ReFit-test) (briefly describe): To whom? For what?	E. Follow-up provided (briefly describe / comments):
83	ER Improper doffing.	Guidance on - did not throw mask away after using it.	None.	Will speak with Manager regarding policy on mask re-use and disposal.
84	ER Improper donning/wearing.	Guidance on - nosepiece fit.	None.	
85	ER Improper donning/wearing.	Guidance on - fit check.	None.	
86	ED Improper donning/wearing.	Guidance on - strap placement.	None.	
87	Security Improper donning/wearing.	Guidance on - mask upside down, no nosepiece adjustment, no fit check.	None.	Will speak to Employee Health regarding Security Officers being taught to properly wear/don masks.
88	ED Improper donning/wearing.	Guidance on - nose adjustment, self test.	None.	
89	ED Improper donning/wearing.	Guidance on - self test.	None.	
90	ER Improper donning/wearing.	Guidance on - strap placement.	None.	
91	ER Improper donning/wearing.	Guidance on - fit check.	None.	
92	ER Improper donning/wearing.	Guidance on - fit check.	None.	
93	ER Improper donning/wearing.	Guidance on - fit check.	None.	
94	ER Improper donning/wearing.	Guidance on - nosepiece fitting.	None.	
95	ER Improper donning/wearing.	Guidance on - strap placement, fit check.	None.	
96	ER Improper donning/wearing.	Guidance on - fit check.	None.	
97	ER Improper donning/wearing.	Guidance on - fit check, donning straps.	None.	
98	ER Improper donning/wearing.	Guidance on - strap placement.	None.	
99	ER Improper donning/wearing.	Guidance on - Fit-test.	None.	
100	ER Improper donning/wearing.	Guidance on - Fit-test.	None.	
101	ER Improper donning/wearing.	Guidance on - nosepiece fit.	None.	
102	ER Improper donning/wearing.	Guidance on - fit check.	None.	
103	ER Improper donning/wearing.	Guidance on - donning of straps.	None.	

Practice Champion Checklist /Log Data

	A. Date/Location (e.g., Patient Room):	B. Briefly describe incident or observation, or guidance request (e.g., not wearing respirator, improper donning/doffing):	C. Resolution (briefly describe action / guidance / resources provided):	D. Referral needed (e.g., ReFit-test) (briefly describe): To whom? For what?	E. Follow-up provided (briefly describe / comments):
104	ER	Improper donning/wearing.	Guidance on - fit check.	None.	
105	ER	Improper donning/wearing.	Guidance on - nosepiece fitting.	None.	

Practice Champion Checklist /Log Data

HOSPITAL B					
A. Date/Location (e.g., Patient Room):	B. Briefly describe incident or observation, or guidance request (e.g., not wearing respirator, improper donning/doffing):	C. Resolution (briefly describe action / guidance / resources provided):	D. Referral needed (e.g., ReFit-test) (briefly describe): To whom? For what?	E. Follow-up provided (briefly describe / comments):	
106	8/1/2013 Employee Health (EH)	B. Briefly describe incident or observation, or guidance request (e.g., not wearing respirator, improper donning/doffing): PAPR training. Fit-testing.	C. Resolution (briefly describe action / guidance / resources provided): Demonstrated PAPR use, detailed use on N-95, answered questions, described importance of respiratory protection.	D. Referral needed (e.g., ReFit-test) (briefly describe): To whom? For what? N/A	E. Follow-up provided (briefly describe / comments): Return as needed or for Fit-testing: directed to return for weight loss/gain, face altering surgery, beard growth, 364 days, 12 months.
107	8/1/2013 EH	PAPR Training.	PAPR use only. Full beard.	Adjust strap as needed.	If employee shaves, Fit-test with EH as soon as possible. Do not wear N-95 until Fit-tested.
108	8/2/2013 1A	Information provided. Talked about PAPR training and use, when to wear N-95, Diseases, etc.	Advised to come to EH for demonstration if needed. Employee has been instructed on respirator use before.	EH to re-enforce learning needs.	Able to discuss appropriate use/needs and correct application, cleaning, and storage.
109	41488	Fit-testing/PAPR training.	Focused on attention to the use of our PAPRs, which are different from ones used in the past.	N/A	Fit-test every 364 days/12 months or whenever the face shape changes: weight loss/gain, face altering surgery, beard growth.
110	8/9/2013 Hallway and EH	Fit-test, PAPR training conducted with employee.	Explained proper technique, reinforced teaching.	Follow-up with EH if needed or with questions.	Reinforced Fit-test requirements, uses, seal technique, proper N-95 size.
111	8/9/2013 EH	Fit-test, PAPR training conducted with employee.	Explained proper techniques, reinforced teaching, allowed for repeat demonstration.	Follow-up in EH or Infection Control (IC) if needed or with questions or concerns.	None

Practice Champion Checklist /Log Data

A. Date/Location (e.g., Patient Room):	B. Briefly describe incident or observation, or guidance request (e.g., not wearing respirator, improper donning/doffing):	C. Resolution (briefly describe action / guidance / resources provided):	D. Referral needed (e.g., ReFit-test) (briefly describe): To whom? For what?	E. Follow-up provided (briefly describe / comments):
112	8/9/2013 Cafeteria/ Security staff	Reviewed N-95 / PAPR use guidelines by asking people who worked in patient care areas.	Follow-up with EH for demonstration if needed.	Reinforced N-95 and PAPR use.
113	8/9/2013 Cafeteria/OR staff	Reviewed N-95/PAPR use guidelines by asking people who worked in patient care areas.	Follow-up with EH for demonstration on PAPR if needed.	Reinforced PAPR use.
114	8/14/2013 2A	Discussed with RN disease processes for N-95 use, re-use for PAPR, policy, cleaning of PAPR	None	Reinforced teaching.
115	8/14/13 1A	Discussed with Care Manager PAPR use, technique. Discussed seal check with aide.	None	Reinforced teaching as needed.
116	8/14/2013 Cafeteria	Asked questions about N-95 use with staff.	Follow-up with EH or IC if needed. Call with questions or concerns.	Reinforced teaching.
117	8/14/2013 Cafeteria	Asked questions about N-95 use / PAPR use with staff from different depts. that were in line	Follow-up with EH to practice with PAPR if needed.	Reinforce teaching as need, refer to EH, IC
118	8/15/2013 EH	Re-appointment of MD who hadn't been Fit-tested in 2 years.	Fit-test, PAPR Training.	Follow-up with EH, IC with questions.
119	8/15/2013 EH	Re-appointment of MD who hadn't been Fit-tested in 2 years. Refuses to wear PAPR.	Fit-test completed and passed after 2 attempts. Re-adjusted.	Follow-up with EH/IC with questions.
120	8/15/2013 EH	Fit-tested new employee.	Fit-test/PAPR trained.	Follow-up with EH with questions or concerns.

Practice Champion Checklist /Log Data

	A. Date/Location (e.g., Patient Room):	B. Briefly describe incident or observation, or guidance request (e.g., not wearing respirator, improper donning/doffing):	C. Resolution (briefly describe action / guidance / resources provided):	D. Referral needed (e.g., ReFit-test) (briefly describe): To whom? For what?	E. Follow-up provided (briefly describe / comments):
121	8/15/2013 EH	Fit-tested/PAPR trained new employee.	Discussed reasons and importance of N-95 use, no hospital experience	Fit-test/PAPR trained.	Follow-up with EH with questions or concerns.
122	8/15/2013 EH	Radiology tech PAPR trained R/T facial hair and re-scheduled for Fit-test when clean shaven.	PAPR trained only. Discussed reasons for PAPR, N-95 use	Discussed OSHA requirements, standards.	Fit-test re-scheduled employee plans to be shaved.
123	8/19/2013 EH	Rescheduled Fit-test for clean shaven ODS employee. PAPR trained today. No hospital experience.	PAPR trained only today. Discussed reasons for PAPR, N-95 use.	Follow-up with EH.	Re-schedule for fit-testing at later date.
124	8/24/2013 IA	Questioning staff. Educating them on use, technique of N-95, PAPR.	Discussed reasons to wear, signage, items needed, requirements.	Responses appropriate.	Follow-up with EH if needed or with questions, comments or concerns.
125	8/23/2013	PAPR review training and skills check off with MRI staff.	Trained staff one on one re; questions, concerns, proper use and techniques for PAPR.	EH RNs and staff. IC nurses for reinforcement teaching, skills check off; train the trainer.	Follow-up with EH, IC for concerns, issues, questions.
126	8/27/2013 EH	PAPR trained Environmental Services employee and Fit-tested. No hospital experience.	Detailed description of Fit-testing requirements, importance.	Fit-test, PAPR trained employee.	Follow-up with EH with questions, comments, concerns.
127	8/27/2013 EH	PAPR training.	Chaplain desired Fit-testing but doesn't meet requirements for department. PAPR trained. Discussed in detail.	PAPR trained, answered questions, resolved concerns.	Follow up with EH.
128	8/28/2013	Fit-test MD who has never been Fit-tested.	Explained process and reasoning, Discussed requirements in detail.	None	Follow-up with IC and spoke to IC nurse, Follow-up with EH p.r.n.
129	8/28/2013	Fit-test MD who hadn't been Fit-tested in 3 years.	Explained reasoning and process.	None, Fit-test done without difficulty.	Follow-up with EH, IC p.r.n. with questions, concerns.

Practice Champion Checklist /Log Data

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130	6/7/2013 (Environmental) Employee Health "EH"	Unaware of difference between "mask" for droplet isolation and N-95 Respirator.	Reviewed isolation signs and showed "N-95" on airborne signs.	Employee Health/Infection Prevention in native language (interpreter present).	Reviewed importance of reading isolation signs and why different diseases are different.
131	6/10/2013 Pt. care/Women and children EH	Not Fit-tested since 1/2007.	Notified manager. Fit-Test scheduled. OSHA/Infection guidelines.	Fit-test scheduled and completed.	Stressed importance of annual Fit-testing.
132	6/10/2013 (Interpreter) EH	Previously failed N-95 Fit-test and does not feel comfortable using PAPR for protection. Also unaware of annual Fit-test requirement.	Instructed on proper fit and placement of straps. Stressed proper placement and seal of metal nosepiece.	Repeat Fit-test.	Wearing N-95 too high. Proper placement on bridge of nose and seal stressed. Overall fit factor 190 after adjustments.
133	6/10/2013 EH (Pt. Care) Women and Children)	Fit Factor not achieved.	Tighten straps.	Repeat Fit-test.	Straps tightened prior to use. Overall fit factor achieved. Instructed employee to tighten straps prior to every use.
134	6/13/2013 EH (Security)	Unaware of need for N-95 – airborne protection.	Encouraged to schedule N-95 Fit-test with Employee Health.	Fit-test scheduled.	Instruction on OSHA guidelines for N-95 respirator use.
135	6/13/2013 EH (Environmental)	Arrived for Fit-test with facial hair (beard).	Do not Fit-test. Must not use N-95.	Employee Health – Fit-test not possible.	Instructed employee on PAPR use. Do not use N-95 with beard. Use PAPR only.
136	6/13/2013 EH (Pt. Care General Surgery)	Wearing inappropriate size. Employee states she wears 1870, but fit factor not achieved.	Reviewed record. 1860 small is previously recorded size.	Repeat Fit-test.	Employee is re-fitted with 1860S, Fit factor achieved. Sticker given for badge as a reminder.

Practice Champion Checklist /Log Data

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137 EH (Pt. Care Women and Children)	Needs to tighten straps. Fit factor not achieved (gap under chin).	Tightened straps; re-Fit-tested.	Repeat Fit-test.	Fit factor achieved after straps tightened. Instructed employee and wrote on "Wear it Right" handout.
138 EH (Pt. Care ICU)	Unaware of N-95 and beard policy. Employee with full beard (RN) states " I can pass the Fit-test".	OSHA Guidelines reviewed.	Fit-test not completed.	Stressed OSHA guidelines – must not wear N-95 with full beard – Sticker for badge and PAPR instructed.
139 EH (Environmental)	Employee unsure of proper PPE for isolation. Reviewed signage – use of N-95 vs. surgical mask.	Isolation signage.		
140 EH (Lab)	Improper reuse of N-95 (Storing N-95 on cart for re- use).	Policy reviewed.	Re-read policy.	Stressed that normal procedure is to dispose of respirator after every use. Never re-use for different patients.
141 EH (Pt. Care Ortho)	Not properly sealing N-95, not doing seal check.	Re-instructed	Repeat Fit-test.	Demonstrated proper seal on bridge of nose and proper seal check. Fit factor achieved.
142 EH (Security)	Improper donning.	OSHA guidelines. Wear It Right.	Repeat Fit-test.	Bottom of duckbill tucked completely tucked under – Straps incorrectly placed. Instructed on proper donning and fit factor achieved.
143 EH (Physician practice)	Not wearing respirator, Unaware of when N-95 and/or patient masking required.	Infection Control Policy.	Fit-test (initial).	Instructed in airborne precautions per IC policy. Proper donning/doffing. Materials given for her office for other staff.

Practice Champion Checklist /Log Data

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144 EH (Physician practice)	Not wearing respirator.	Infection Preventionist (CIC) Referral.	Infection Preventionist.	Provider did not understand requirement for respirator use. Referred to infection Preventionist. Follow-up scheduled with entire practice at next staff meeting.
145 EH (Pt. Care CCU)	RN not in compliance with annual Fit-test (last tested 2011)	Re-Fit-test Completed	Contacted Manager.	Fit-test completed. Stressed reason and need for annual Fit- test. Manager notified.
146 EH (Environmental)	Not wearing respirator	Infection Control policy reviewed.	Repeat Fit-test.	Employee unsure of proper times to wear respirator. Instructed on difference between mask and respirator. Stressed reading Isolation signs.
147 EH (Plant operat.)	Donning with facial hair	OSHA guidelines reviewed.	PAPR Instructed.	Stressed the need for loose fitting respirator (PAPR) due to beard. Notified manager.
148 EH (Plant operat)	Donning with facial hair.	OSHA guidelines reviewed.	PAPR Instructed.	Stressed the need for loose fitting respirator (PAPR) due to beard. Notified manager.
149 EH (Security)	Not in compliance with Fit-test.	Fit-test (Initial). Infection Control policy. OSHA guidelines.	Fit-tested.	Contract employee not familiar with respirator use. Fit-tested and stressed OSHA guidelines and isolation policy/signage.
150 EH (Vascular)	Donning with facial hair.	OSHA guidelines reviewed.	PAPR instructed.	Stressed need for loose fitting respirator (PAPR) due to beard. Notified manager.
151 EH (Security)	Not wearing respirator.	Notified manager. Fit-test scheduled. OSHA/Infection guidelines.	Fit-test (Initial) scheduled.	Contract worker never Fit-tested. Unaware of proper respirator use. Trained on OSHA guidelines/IC practices.

Practice Champion Checklist /Log Data

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152 7/3/2013 EH (Clinical Eng)	Donning with facial hair.	OSHA guidelines reviewed.	PAPR instructed.	Stressed need for loose fitting respirator (PAPR) due to beard. Notified manager.
153 7/19/2013 EH	Improper donning (not sealing/refusal to). (Surgical Tech not sealing metal nosepiece, not pressing firmly).	Manufacturer's guidelines/OSHA stressed.	Repeat Fit-test.	Stressed proper seal. Not protected if not sealed and seal check procedure. Demonstrated and fit factor achieved.
154 7/26/2012 EH (MD practice)	Not wearing respirator.	OSHA Guidelines /Infection Prevention Guidelines reviewed.	Infection Preventionist and policy.	Reviewed airborne isolation policy. Infection Preventionist scheduled meeting for practice at next staff meeting.
155 7/26/2012 EH (private provider)	Improper donning.	Manufacturer's Guidelines for donning. OSHA "Wear It Right".	Repeat Fit-test.	Reviewed guidelines. MD receptive and appreciative. Fit factor achieved after adjustments.
156 6/11/2013	RN not wearing N-95 for bronchoscopy. RN had on regular surgical mask.	RN and MD reminded that N-95s must be worn during ALL bronchoscopies. Both put on N-95s.	No referral needed.	Proper donning/doffing observed the next bronchoscopy. Below.
157 6/12/2013 RN, MD, Lab, RCP	EBUS – 1 hour procedure	Observed fit throughout.		Observed mask donning/doffing prior to bronchoscopy. Good technique.
158 6/19/2013 RN, MD, Lab, RCP	EBUS			Observed proper donning/doffing.
159 6/28/2013 Tech-Assist, RN, MD, Lab, RCP	EBUS			Observed proper donning/doffing.
160 6/28/2013 Lab, MD	Bronchoscopy.	N/A	N/A	Good donning/doffing.

Practice Champion Checklist /Log Data

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161	7/11/2013 RCP x2. RN, Lab, MD	RN came to procedure with regular surgical mask. EBUS – 1.5 hrs.	Spoke to RN about requirements to wear N-95 for ALL Bronchoscopy/EBUS	No. RN had not done EBUS in awhile. Correct mask applied.	Good donning/doffing.
162	7/16/2013 RN, RCP, MD	RN came to procedure with regular surgical mask.	Spoke to RN prior to procedure. Correct N-95 used prior to procedure.	No.	Donning. Good Fit-test up to date.
163	7/19/2013	Bronchoscopy – student requested to observe. Student had not been Fit-tested.	Student observed through a window from outside the room.	No.	N/A
164	7/26/2013 MD, RCP, RN, Lab Tech	Bronchoscopy	N/A	No.	Proper donning and doffing of N-95s.
165	7/30/2013	MD not aware that N-95s had to be worn with all bronchoscopies and in negative pressure room.	Discussed regulations regarding N-95s.	No.	Good donning and doffing by MD and other staff involved with bronchoscopy.
166	8/7/2013 MD	Student asked to observe bronchoscopy. The student had not been fit-tested.	Student wore a PAPR.	No	Good donning and doffing of PAPR.
167	8/27/2013 RN, MD	Bronchoscopy. Observed RN and MD don and doff N-95 mask properly.	_____	N/A	N/A
168	9/6/2013 EMT	Bronchoscopy. EMT had not been fit-tested for Regular N-95.	Wore PAPR	N/A	Good donning and doffing with proper disinfection post removal.

Practice Champion Checklist /Log Data

Hospital C				
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169	EV	Showed me how she would wear her mask and did great.	Told her to make sure she has a good fit.	
170	CP	Asked what type mask would she wear and how when going in a AFB room.	Put the mask on and took it off correctly.	I told her to make sure she had a good fit before going into the room.
171	CP	Asked what type mask he would wear. He had facial hair.	PAPR - He showed me where they kept the machine and where he would get one if they didn't have one.	I told him how long it needed to be charged.
172	In-service 3 South Staff	Asked what type mask would they wear with facial hair.	PAPR - where they would get the machine if they did not have one. They showed me where they kept the machine.	I told them how long it needed to be charged.
173	RN	She showed how she would wear the mask, when she would wear it, and how she would remove it.		I told her if she had to return to the room to always get a new mask.
174	RN	She showed how she would wear the mask, when she would wear it, and how she would remove it.		I told her if she had to return to the room to always get a new mask.
175	OT	Did know how to wear the PAPR.	Went over how to test for good air flow, charge, where they were kept.	Put PAPR on to show how it worked.
176	CP	Watched her put her mask on correctly.		I told her to make sure she always has a good fit.

Practice Champion Checklist /Log Data

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177	RN	ISU unit - all rooms are positive pressure.			
178	SP	Had small amount of facial hair. Explained to him to not wear his N-95 because he would not have a good fit. Need to be clean shaven.			
179	CPU	Went over the Fit-testing process with her.			Watched her put on her mask correctly. Explained to always get a new mask.
180	EV	Showed me where masks were kept. When she would wear the N-95.		Went over the Fit-test process with her.	Make sure she has a good fit. No air leaking out.
181	RN	Nurse asked if BP is normal when passing (Fit-test) but on day of wearing mask BP is high, should they wear mask?		IC/EH	I said "No" if BP is high.
182	CP	Visit to Emergency Department	They told me how they wear the mask and when they wear them.	I was shown all the negative pressure rooms and where they kept masks.	
183	PT	Wear PAPR.	Told him if the floor didn't have a machine, get one from Central.	If you had facial hair or fail Fit-test, you would wear PAPR.	
184	East care	He put mask on the correct way.		When and how they should wear N-95.	Told him to make sure he had a good fit when putting the mask on.
185	CP	Went over how mask should be worn and when they should wear them.			Blood pressure has to be below 160/100.
186	EVM	Would wear PAPR. Told him where he was to get the machine and the hood.			I told him how to test the machine and if it wasn't charged not to use it.

Practice Champion Checklist /Log Data

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187	CP	Put mask on wrong. Crossed the straps over her head.	I put her mask on correctly and demonstrated how to remove it.		I told her that the straps should never cross each other; top strap at the crown of her head; bottom strap at the back of her neck.
188	Student	Did an in-service with the Pitt Students on the mask.	Showed them how to put the mask on correctly.		
189	Nurse - male	Went over how and why he would wear the air filter (PAPR). He knew how to wear it.	He knew where they were kept on the unit.		
190	CP	She knew how to wear the mask but took it off wrong. I went over removing the mask and that it should only be worn once.	We put it back on and she removed it the right way.		
191	2N CP MIU 3/9/2013	No patients on AFB. Employee described where supplies are; how to use and discard.	Employee was very aware of when to wear; what type of patient.		
192	2N RN MIU 3/9/2013	No patients. Employee showed where supplies are kept.	Described how mask is used, when, and why.		
193	2N MIU EVS	No patients. Employee was new to area. Showed me where supplies were.	Went over usage of mask, how to use and when.	Ask Employee was she Fit-tested before pre-employment. She remembered when she was told.	
194	2N MIU Resp. Care	No patients. Was aware of supplies, when to use and not to re-use.	Described how to use mask. On and off.		

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195 3N BGSU 7/11/2013 RN	No AFB Rooms in use.	RN described what she would use. Proper placement of mask, where supplies are stored and how to discard.		
196 3N BGSU 7/11/2013 CP	No AFB Rooms in use.	CP wasn't sure at first about AFB vs. just contact.	Explained to CP to wear N-95. How to properly use and when. Once talking with CP, she remembered more of what to wear.	Explained to CP use of PAPR, where to get and how to use. CP was comfortable and aware of use.
197 3N BGSU 7/11/2013 EVS	No AFB Room in use.	Employee was aware of when to use and what mask to use. Demonstrated how to use mask and discard.	Where supplies were kept.	
198 3N BGSU 7/11/2013 PT Tech	No AFB Room in use.	PT Tech knew to wear mask but wasn't aware of PAPR with facial hair.	PAPR not kept on floor. Explained to tech to get PAPR from Central Supply and hood from stock room.	
199 3N BGSU 7/11 RN Asst Nurse Mgr (ANM)	No AFB Room in use.	ANM described what employees would wear and where supplies are kept.	Stated PAPR not kept on floor but knew to get from Central Supply.	
200 5th 7/16 RN	No AFB Room in use.	RN showed me equipment room/supplies and explained how to use and discard.	Stated and showed they had hoods for PAPR, but PAPR was obtained from Central.	
201 5th 7/16 RN	No AFB Room in use.	Male RN with beard explained that he wore PAPR. Was able to explain how to check charge and use.		

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202 5th 7/16 RN	CIU No AFB Room in use	CP explained what she would wear and how to discard after use.	She knows PAPR would be used if mask didn't seal properly and that PAPR came from Central.	
203 5th 7/16 Student RN	CIU No AFB Room in use.	She was aware of AFB room. Went over what to use and how. She knows where supplies were kept.	?	
204 7/30 2 East	2 AFB Rooms. None in use.	Spoke with Charge Nurse. She explained use and equipment. Correct mask worn in ante-room.	No PAPR found on floor but is usually kept in unit storage.	
205 8/6 3 EAST Charge Nurse	2 AFB Rooms. None in use.	Charge nurse explained and showed supplies and how to use. N-95 mask and PAPR were on floor in ante-rooms.	Hoods and mask kept in packages.	
206 8/13 MIU Review RN	NO AFB. Room in use.	Spoke with RN. She explained why mask was worn and was able to demonstrate putting on and taking off mask.		
207 8/13 MIU Review	No room in use.	Care partner showed me where supplies were kept. Was able to demonstrate putting on and taking off mask.		
208 8/20 CW review	No room in use.	Respiratory Care Practitioner male w/beard, knew to wear PAPR. Demonstrated how to test and use equipment.		

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209	8/20 CW review	No room in use.	Care partner knew when to wear mask and to only use once.	CP was able to put mask on correctly and CP was comfortable with use. I had to demonstrate and remind CP how to take off.	
210	8/20 CW review	No room in use.	Housekeeping staff knew where supplies were and when to use. Not completely sure of putting on and taking off.	Worked with employee and demonstrated. Employee was able to put on and take off prior to me leaving.	
211	8/27/13 Physical Therapy Asst.	No room in use.	Physical Therapy Asst. demonstrated putting on and taking off mask.		
212	8/28/13 RN	No room in use.	Male RN demonstrated putting on and taking off mask. Was also aware of using PAPR with facial hair.		

Practice Champion Checklist /Log Data

Hospital D					
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213	9/10/13 OHS	Improper donning N-95; Employee pulled mask over head to cover nose and mouth.	Employee showed proper way to put on N-95.		
214	9/10/13 OHS	Tried to wear N-95 with beard.	Explained that due to facial hair, mask cannot seal properly.	Educated on use of PAPR.	
215	8/13/13	Employee donned N-95 properly.	Reminded to perform seal check after donning mask.		
216	7/9/13	Employee donned mask improperly by pulling both straps overhead at the same time.	Shown proper way to don/doff N-95. Also to always do seal checks.	Will be Fit-tested annually.	
217	6/10/13	Employee to wear PAPR due to facial hair. Very knowledgeable about use of PAPR.			
218	7/29/13	Proper donning/doffing exhibited.	Reminded always to perform seal checks when donning N-95.		

Practice Champion Checklist /Log Data

Hospital E					
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219	6/11 Education dept.	Asked nurse what size respirator she wore. She stated "I think I'm a regular, but I lost weight, so I grab a small."	Explained to nurse she must be re-fit anytime she gains or loses 10 lbs. or more.	I re-fit the nurse that day for accurate respirator which was 3M-small.	Had nurse keep mask she was fitted with to place in locker as a reminder of current size.
220	6/20 Education Dept.	When Fit-testing a nurse, she did not check for seal.	Educated nurse to check for seal every time.	None.	None.
221	6/25 Education Dept.	When fitting several nurses, found them wanting to pinch the nose with one hand.	Explained that pinching the nose could cause a gap and loss of seal.	None.	None.
222	7/9 Education Dept.	Fit-tested new employees. Some said they had never been through this procedure at other facilities. They had the mask on and the filter squirted the solution a couple of times and if she could not smell or taste the test was over.	Fitted properly using proper technique.	In-house fitters have been notified about changes in Fit-testing to ensure most current recommended technique are used.	explained to staff the importance of protecting yourself and being properly fit-tested.
223	7/23	Fit-tested new employees. Most do not know proper donning and doffing.	Educated on proper donning and doffing and seal check.	None.	None.
224	8/6 ICU 3	Nurse entering room improperly donned the N-95.	Explained proper donning and doffing procedure.	None.	Had nurse demonstrate proper donning and doffing.
225	8/8 ICU 3	Respiratory therapist entered room with improperly donned mask.	Explained proper donning and doffing procedure.	None.	Had RT demonstrate proper technique.

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226	8/19 MH 506	Patient was direct admit from another hospital and automatically placed on insolation to rule out TB.	None.	None.	None.
227	8/20 MH 506	CNA came out of room improperly donned, hair was under strap.	Re-educated CNA in proper donning and doffing as well as seal check.	CNA donning and doffing.	Demonstration.

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Hospital F					
	A. Date/Location (e.g., Patient Room):	B. Briefly describe incident or observation, or guidance request (e.g., not wearing respirator, improper donning/doffing):	C. Resolution (briefly describe action / guidance / resources provided):	D. Referral needed (e.g., ReFit-test) (briefly describe): To whom? For what?	E. Follow-up provided (briefly describe / comments):
228	Medicine ICU (MICU)	Improper respirator storage. N-95 respirator hung from a hook outside airborne isolation room.	Provided instruction on proper disposal and storage of N-95 respirators.	N/A	Followed up by conducting a walkthrough 2 weeks later. No similar incidents observed.
229	Medicine Progressive Care Unit (MPCU)	Failure to perform user seal check.	Provided instruction on the importance of the user seal check and how to perform one.	N/A	Followed up by conducting a walkthrough 2 weeks later. No similar incidents observed.
230	Various Nursing Units	Improper donning. Failure to use both hands to mold N-95 respirator nose piece. Employees pinch nosepiece with fingers of one hand.	Provided instruction on proper donning.	N/A	Followed up by conducting a walkthrough 2 weeks later. Continuing problem.
231	Surgery/Trauma ICU	Improper donning. N-95 respirator straps not placed correctly (crisscrossed).	Provided instruction on proper donning.	N/A	Followed up by conducting a walkthrough 2 weeks later. No similar incidents observed.
232	Neurosurgical ICU	No incidents observed.	N/A	N/A	N/A
233	Emergency Department	No incidents observed.	N/A	N/A	N/A
234	Pediatric ICU (PICU)	No incidents observed.	N/A	N/A	N/A
235	Bone Marrow Transplant Unit (BMTU)	No incidents observed.	N/A	N/A	N/A

Practice Champion Checklist /Log Data

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236	Intermediate Surgical Care Unit (ISCU)	No incidents observed.	N/A	N/A	N/A
237	Main OR Suite	No incidents observed.	N/A	N/A	N/A
238	Post Anesthesia Care Unit (PACU)	No incidents observed.	N/A	N/A	N/A
239	Burn Center	No incidents observed.	N/A	N/A	N/A