

Respiratory Protection with PPE of Health Care Workers Project



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**Personal Protective Equipment Selection, Use and Expectations:
PPT Stakeholder Meeting and Workshop
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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

Health Care Worker N=342*

Unit Managers N=64*

Hospital Managers N=17*

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
2-4 years	104	30.5	18	28.1	5	29.4
5 or more years	117	34.3	33	51.6	9	52.9

Clinical Information

	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

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 and symptoms	181	26.7	33	24.6	8	22.2
Laboratory 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 door of patient's room	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		Unit Manager		Hospital Manager	
	n	%	n	%	n	%
Total Responses**	677					
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	-	-

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

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	320	94.4	64	100	16	100.0
No	12	3.5	0	0.0	0	0.0
Don't Know	7	2.1	-	-	-	-

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 physician	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 training

	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	-	-	-	-

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	100.0
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

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		Unit		Hospital	
	Worker		Manager		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

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



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



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



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



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



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



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



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



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 a suitably trained workers	n	%
Yes:	15	71.4
No:	5	23.8
Partial:	1	4.8
Medical Evaluation: To ensure that employees are able to wear respirators safely	n	%
Yes:	21	100.0
No:	0	0.0
Partial:	0	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 record?(1 missing)	n	%
Yes:	19	95.0
No:	1	5.0
Training and Information: To ensure that employees understand the facility's written program and the purpose of 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:	n	%
Yes:	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.	n	%
Yes:	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:	n	%
Yes:	10	47.6
No:	8	38.1
Partial:	3	14.3

RPP Training/Information Present

N=19

	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 duff	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	100.0
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