Respiratory Use Evaluation in Acute Care California Hospitals

“REACH”
Preliminary Results

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Background

- CDPH and CDC recommended airborne precautions including N95 respirators for pandemic influenza and H1N1 – May 2009
- Cal/OSHA Aerosol Transmissible Diseases (ATD) Standard became effective August 5, 2009
  - Requires use of N95 or better respirator for “novel virus”
Occupational/public health response
2009-2010 influenza season - California

• Updated infection control guidance
• CalOSHA compliance directives
• Release of respirator stockpile with CDPH guidance
• Weekly CDPH flu stakeholder telecons
• Outreach and trainings on ATD
Objectives

• Describe the extent to which California hospitals have implemented required elements of a respiratory protection program for influenza

• Assess the usage of respiratory protection for influenza exposure among health care workers

Approved by California and NIOSH IRBs as public health practice
Methods

• Sample of California acute care hospitals in 14 Bay Area counties
• “Three x three” surveys of facilities during January-March 2010
  – 3 Hospital managers: overall policies and procedures
  – 3 Unit managers (ER, ICU, pediatrics or med/surg): implementation and oversight
  – 3-5 Health care workers on each unit: knowledge, practices and beliefs, usage and safety culture
Hospital sample selection

All licensed California hospitals
N=510

- License type not General Acute Care (n=63)
- Principal service type not General Med/Surg (n=55)

General acute-care facilities providing general med/surg care
n=392

- No Emergency Department (n=58)
- No Intensive Care beds (n=25)

General acute-care facilities with ED and ICU beds
n=309

- Outside of greater San Francisco area (n=221)

Facilities within 2-hour drive of CDPH Richmond offices
n=88
Hospital Sample Selection

- 16/88 facilities selected by stratified random sample
  - Type
  - Size
  - Rural status

- 20 Hospitals contacted (Director of Nursing)
  - Four declined to participate
    - A hospital of the same type, size, and rural status was randomly selected to replace refusal
## Hospital Distribution by Type

<table>
<thead>
<tr>
<th></th>
<th>CA n (%)</th>
<th>Sample n (%)</th>
<th>$X^2$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>City/County</td>
<td>18 (5.8)</td>
<td>1 (6.3)</td>
<td>14.1</td>
<td>0.75</td>
</tr>
<tr>
<td>District</td>
<td>27 (8.7)</td>
<td>2 (12.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>For-profit</td>
<td>65 (21.0)</td>
<td>2 (12.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-profit</td>
<td>192 (62.1)</td>
<td>10 (62.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>University</td>
<td>7 (2.2)</td>
<td>1 (6.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Size</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 200 beds</td>
<td>154 (49.8)</td>
<td>8 (50.0)</td>
<td>14.1</td>
<td>0.99</td>
</tr>
<tr>
<td>≥ 200 beds</td>
<td>155 (50.2)</td>
<td>8 (50.0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Area</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>40 (12.9)</td>
<td>2 (12.5)</td>
<td>14.1</td>
<td>0.96</td>
</tr>
<tr>
<td>Non-rural</td>
<td>269 (87.1)</td>
<td>14 (87.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>309</td>
<td>16</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Participant Selection

- At each facility, 3 Hospital Managers and 3 Unit Managers interviewed

<table>
<thead>
<tr>
<th>Hospital Managers</th>
<th>Unit Managers</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Infection Control</td>
<td>- Emergency Dept.</td>
</tr>
<tr>
<td>- Nursing</td>
<td>- ICU</td>
</tr>
<tr>
<td>- Employee Health</td>
<td>- Pediatrics</td>
</tr>
<tr>
<td></td>
<td>- Medical/Surgical</td>
</tr>
</tbody>
</table>

- No managers declined to participate
Participant Selection

- 3-5 HCWs from each unit interviewed
  - Unit Managers selected HCWs who were available to participate
  - Study staff asked to interview workers from a variety of job titles when possible

- No HCWs declined to participate
  - May have declined when asked by Unit Manager
## Characteristics of HCW Respondents ($n=204$)

<table>
<thead>
<tr>
<th>Job title</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Registered Nurse</td>
<td>145</td>
<td>71</td>
</tr>
<tr>
<td>Nursing/Patient Care Assistant</td>
<td>12</td>
<td>6</td>
</tr>
<tr>
<td>Respiratory Therapist</td>
<td>12</td>
<td>6</td>
</tr>
<tr>
<td>Technician</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Other (physicians, housekeeping, etc.)</td>
<td>28</td>
<td>14</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time at current job</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\leq$ 1 year</td>
<td>19</td>
<td>9</td>
</tr>
<tr>
<td>$&gt;$ 1 year – 5 years</td>
<td>72</td>
<td>35</td>
</tr>
<tr>
<td>$&gt;$ 5 years</td>
<td>113</td>
<td>55</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type of employee</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employee</td>
<td>196</td>
<td>96</td>
</tr>
<tr>
<td>Contractor</td>
<td>8</td>
<td>4</td>
</tr>
</tbody>
</table>
Vaccine Status

Have you received or do you intend to receive the (seasonal influenza/H1N1) vaccine?

<table>
<thead>
<tr>
<th>Vaccine Type</th>
<th>Yes (%)</th>
<th>No, intend to get it (%)</th>
<th>No, do NOT intend to get it (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seasonal influenza</td>
<td>81%</td>
<td>1%</td>
<td>17%</td>
</tr>
<tr>
<td>H1N1 influenza</td>
<td>77%</td>
<td>3%</td>
<td>20%</td>
</tr>
</tbody>
</table>

Health care worker survey results
Health care worker survey results

Respirator Use

Close contact with suspected or confirmed H1N1 patient

- None indicated: 1%
- Surgical mask: 2%
- N95 respirator: 95%
- PAPR: 3%
- Other: 0%

Of the 199 HCWs who reported having or expecting close contact with H1N1 patients

Aerosol generating procedure on suspected or confirmed H1N1 patient*

- None indicated: 0%
- Surgical mask: 2%
- N95 respirator: 93%
- PAPR: 4%
- Other: 1%

Of the 123 HCWs who reported performing aerosol generating procedures

Note - More than one response may have been selected by each respondent
Problems with N95 Respirators

- Difficult to breathe: 16%
- Moisture buildup: 13%
- Interferes w/ eyeglasses: 4%
- Interferes w/ other PPE: 21%
- Speaking/being understood: 20%
- Uncomfortably warm: 39%
- Claustrophobic: 10%
- Other: 8%
- No problems: 35%

N=193

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

Health care worker survey results
Updated numbers and added N
sbeckman, 5/19/2010
How HCWs know a respirator is needed

- Sign on door of patient room: 97%
- Respirators located near patient room: 59%
- Supervisor informs: 34%
- Coworkers inform: 77%
- Told during shift report: 82%
- HCW decides based on patient assessment: 78%
- Another method: 17%
- Don't know: 0%

N=201

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

Health care worker survey results
Respirator Redonning

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

No – 116 (58%)
Yes – 85 (42%)

If yes, why did you reuse the respirator?

- Due to shortage: 44%
- Standard practice: 45%
- Other reason: 14%
- Don't know: 4%

N=85

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

Health care worker survey results
Updated numbers and added N
sbeckman, 5/19/2010
Knowledge, Beliefs, & Practices

I am at high risk of becoming ill with influenza due to my work: 65% agree, 35% disagree.

Wearing an N95 or better respirator can help protect me from on-the-job exposure to influenza: 96% agree, 3% disagree, 2% don't know.

N95 respirators are more effective at protecting me from influenza than surgical masks: 94% agree, 3% disagree, 2% don't know.

Health care worker survey results
Knowledge, Beliefs, & Practices

Health care worker survey results

- I think that my supervisor would correct me if I did not wear a respirator when it was required by my facility:
  - Agree: 93%
  - Disagree: 4%
  - N/A or Don't know: 2%

- I think that my co-workers would correct me if I did not wear a respirator when it was required by my facility:
  - Agree: 96%
  - Disagree: 3%
  - N/A or Don't know: 1%

N=203
Health care worker survey results:

- Managers at my facility... provide safety training that is convenient for workers (N=202): 93% Agree, 6% Disagree, 0% N/A or Don't know
- ... quickly correct safety hazards, even if they require costly improvements: 86% Agree, 10% Disagree, 4% N/A or Don't know
- ... regularly hold safety awareness meetings: 82% Agree, 15% Disagree, 3% N/A or Don't know
At my workplace... employees feel free to report safety or health violations to their supervisors

... the health and safety of workers is a high priority with the management

... the management shares the same values with respect to safety as me

Health care worker survey results
Characteristics of Unit Managers

• 45 unit managers interviewed
  – Three unit managers at each of 13 hospitals, two interviewed at remaining three hospitals
  – Selected from units most likely to have patients with H1N1 influenza
    • Emergency Department – 14 (31%)
    • Intensive Care – 14 (31%)
    • Medical-Surgical Units – 12 (37%)
    • Pediatric – 5 (11%)
Hospital Policies & Procedures

How are you informed about respiratory protection requirements at your facility?

- Email: 98%
- Signs: 76%
- Trainings: 91%
- Written notification: 84%
- Meetings: 96%
- Informed verbally: 80%
- Other: 11%

“Other” included county EMS emails, Infection Control rounds, intranet, member of Infection Control informs

N=45

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

Unit manager survey results
Updated numbers and added N
sbeckman, 5/19/2010
Hospital Policies & Procedures

How do you communicate hospital policies about respiratory protection to your employees?

- Email: 78%
- Signs: 82%
- Trainings: 76%
- Written notification: 73%
- Meetings: 96%
- Informed verbally: 91%
- Other: 13%

“Other” included meeting w/ assistant managers, modeling behavior, intranet, huddles, shift report, during fit testing

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

Unit manager survey results

N=45
Updated numbers and added N
sbeckman, 5/19/2010
Enforcement of Proper Respirator Use by Unit Managers

• 13 (29%) report **formally** observing use of respirators by their staff (for example, by use of an audit or checklist)

• 44 (98%) report **informally** observing respirator use by their staff

• 45 (100%) report counseling of workers after repeated violations of respirator policies
Fit Testing

• Do you maintain records of fit testing for your staff?
  
  **Yes** – 29 (64%)  **No** – 16 (36%)

• How do you know if a staff member has received a respirator fit test?

<table>
<thead>
<tr>
<th>Response</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Another department notifies me</td>
<td>39</td>
<td>87</td>
</tr>
<tr>
<td>I contact hospital management to find out</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>The staff member informs me</td>
<td>8</td>
<td>18</td>
</tr>
<tr>
<td>I don’t know</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Other</td>
<td>7</td>
<td>16</td>
</tr>
</tbody>
</table>

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

Do you have any staff who could not be fitted with an N95 respirator?

- No – 16 (36%)
- Yes – 29 (62%)
- Don’t know – 1 (2%)

If yes, are there PAPRs available for these staff?

- Yes – 79%
- No – 10%
- Don't know – 9%

N=29

Unit manager survey results
Facility Respirator Requirements

Close contact (≤6 feet) with suspected or confirmed H1N1 patients

- Droplet (surgical mask): 7%
- Airborne (N95): 93%
- Don’t know: 0%

N=45

Aerosol generating procedures on suspected or confirmed H1N1 patients

- Droplet (surgical mask): 0%
- Airborne (N95): 95%
- Don’t know: 5%

N=44

Unit manager survey results
Plans to Conserve N95s

Does your facility have a plan to conserve N95 respirator distribution in the event of a shortage?

**Yes** – 30 (67%)  **No** – 4 (9%)  **Don’t Know** – 11 (24%)

*Note* - More than one response may have been selected by each respondent
Plans to Prioritize N95s

Does your facility have a plan to prioritize N95 respirator distribution in the event of a shortage?

<table>
<thead>
<tr>
<th>Yes – 15 (33%)</th>
<th>No – 5 (11%)</th>
<th>Don’t Know – 25 (56%)</th>
</tr>
</thead>
</table>

High hazard procedures: 80%
Staff caring for other ATD patients: 87%
Staff not vaccinated: 27%
Staff at high risk for complications: 53%
Other: 0%
Don’t know: 13%

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

Unit manager survey results
Characteristics of Hospital Managers

• 48 hospital managers interviewed
  – Three managers at each of 16 hospitals
  – Directors of Infection Control, Employee Health, and Nursing or delegate targeted

• Reported working in the following departments:
  – Infection Control: 17 (38%)
  – Employee Health: 16 (33%)
  – Nursing: 16 (33%)
  – Other: 3 (6%)

Note: Four managers reported working in more than one department
Written Respiratory Protection Programs

- California Code of Regulations Title 8§5144 Respiratory Protection
- Present in 15 of the 16 hospitals visited
Employees not included in RPP

- Are there any employees at your facility who have patient contact and who are not included in the RPP?
  - **No** – 39 (81%)
  - **Yes** – 7 (15%)
  - **Don’t know** – 2 (4%)

- Employees not covered:
  - Admitting clerks (3 responses)
  - Food service (3 responses)
  - Outpatient cancer clinic (1 response)
  - Discharge planning (1 response)
  - Physicians (1 response)
RPP Policy Decisions

Departments that decide on policies regarding use of respiratory protection:

- Infection Control: 100%
- EH&S: 56%
- Employee Health: 79%
- Nursing: 33%
- Unit Mgrs: 94%
- Materials Mgmt: 90%
- Other: 25%

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

- All staff medically evaluated before being allowed to wear a respirator?
  - Yes – 46 (96%)  
  - No – 0  
  - Don’t Know – 2 (4%)

- Medical evaluations performed by:

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facility Emp. Health PLHCP*</td>
<td>38</td>
<td>84</td>
</tr>
<tr>
<td>Employee’s own PLHCP</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Contracted service</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>Infection Control staff</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Don’t know</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

* Physician or other Licensed Health Care Provider
Medical Evaluations

How often are medical evaluations conducted?

- 72% once at hire, then annually
- 20% once at hire, then as needed
- 4% don't know
- 2% once at hire, then at next fit test

Hospital manager survey results (N=46)
Fit Testing

• All staff fit tested before being allowed to wear a tight-fitting respirator?
  Yes, always – 45 (94%)  Yes, sometimes – 3 (6%)

• Fit testing conducted by:

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital personnel</td>
<td>42</td>
<td>88</td>
</tr>
<tr>
<td>Respirator manufacturer</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Contracted Service</td>
<td>15</td>
<td>31</td>
</tr>
<tr>
<td>Human Resources</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

*Note* - More than one response may have been selected by each respondent.
How often is fit testing conducted for each employee?

- **83%**: Once at hire only
- **6%**: Once at hire, then annually
- **6%**: Once at hire, then as needed
- **6%**: Don't know
- **2%**: Once at hire, then when possible

Hospital manager survey results

N=48
Program Evaluation

• Is there a **formal** mechanism or method to evaluate the effectiveness of the RPP?
  
  **Yes** – 21 (45%)  **No** – 15 (32%)  **Don’t know** – 11 (23%)

• Among the facilities with formal program evaluation:
  
  – Infection Control and Employee/Occupational Health were most often cited as performing the evaluation
  
  – 12 (57%) of these managers reported including input from respirator users
Respiratory Protection
Close Contact

What is the minimum level of respiratory protection employees are required to use when in close contact (≤ 6 feet) with a patient who has confirmed or suspected H1N1?

Hospital manager survey results
Respiratory Protection
Aerosol Generating Procedures

What is the minimum level of respiratory protection employees are required to use when performing aerosol generating procedures on a patient who has confirmed or suspected H1N1?

Hospital manager survey results
Plans to Conserve N95s

Does your facility have a plan to **conserve** N95 respirator distribution in the event of a shortage?

- **Yes** – 45 (94%)
- **No** – 1 (2%)
- **Don’t Know** – 2 (4%)

*Note* - More than one response may have been selected by each respondent
Does your facility have a plan to prioritize N95 respirator distribution in the event of a shortage?

**Yes** – 37 (77%)  **No** – 3 (6%)  **Don’t Know** – 8 (17%)

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

Does your facility have a written policy for redonning of respirators when workers are in close contact with patients with suspected or confirmed H1N1?

**Yes** – 34 (71%)  **No** – 6 (13%)  **Don't Know** – 8 (17%)

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

Hospital manager survey results
Shortages

• 50% of Hospital Managers reported that their facility had experienced a shortage of N95 respirators between April 2009 and the time of the interview
  – The term “shortage” was not defined, so answers depended on respondent’s definition of a shortage of respirators

Hospital manager survey results
Reasons for Shortage

Increased demand, increased staffing: 13%
Increased demand, increased patient load: 92%
Used when not needed: 25%
Supplier shortages: 83%
Allotment from supplier: 67%

Hospital manager survey results

N=24
How Shortage Was Avoided

- No increased demand: 27%
- Stockpiled N95s: 55%
- Requested from LHD: 5%
- Other: 55%

Hospital manager survey results

N=22
Managers at my facility... provide safety training that is convenient for workers
... provide safety training that is informative for workers
... quickly correct safety hazards even if they require costly improvements

Agree: 98% 96% 94%
Disagree: 2% 4% 4%
N/A or Don't know: 0% 0% 2%

N=48

Hospital manager survey results
Managers at my facility... communicate regularly with workers about health and safety issues: 96% Agree, 0% Disagree, 2% N/A or Don't know. N=48

... consider a person's safety behavior when moving or promoting people: 73% Agree, 6% Disagree, 21% N/A or Don't know.

... regularly review and update existing safety rules: 94% Agree, 4% Disagree, 2% N/A or Don't know.
Managers at my facility... provide workers with information on safety issues

- Agree: 96%
- Disagree: 2%
- N/A or Don’t know: 2%

... include safety information in staff meetings

- Agree: 92%
- Disagree: 0%
- N/A or Don’t know: 8%

Hospital manager survey results
At my workplace... employees are told when they do not follow good safety and health practices

... employees feel free to report safety or health concerns to their supervisors

Hospital manager survey results
At my workplace... the health and safety of workers is a high priority with the management

- Agree: 98%
- Disagree: 0%
- N/A or Don't know: 2%

... workers and management share the same values with respect to safety

- Agree: 88%
- Disagree: 6%
- N/A or Don't know: 6%

N=48

Hospital manager survey results
Respiratory Protection Worn

Type of mask or respirator worn by HCWs who have close contact with patients who have suspected or confirmed H1N1

<table>
<thead>
<tr>
<th>Mask Type</th>
<th>HCW - Practice</th>
<th>Unit Mgr - Policy</th>
<th>Hosp Mgr - Policy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surgical mask</td>
<td>5%</td>
<td>7%</td>
<td>10%</td>
</tr>
<tr>
<td>N95 or PAPR</td>
<td>96%</td>
<td>93%</td>
<td>85%</td>
</tr>
<tr>
<td>Don't know</td>
<td>0%</td>
<td>0%</td>
<td>4%</td>
</tr>
</tbody>
</table>

Comparative survey results
Respiratory Protection Worn

Type of mask or respirator worn by HCWs who perform aerosol generating procedures on patients who have suspected or confirmed H1N1

Comparative survey results
Employees and management share the same values with respect to safety.

Comparative survey results

- **Agree**
  - HCW: 91%
  - Unit Mgr: 98%
  - Hospital Mgr: 88%

- **Disagree**
  - HCW: 8%
  - Unit Mgr: 2%
  - Hospital Mgr: 6%

- **N/A or Don't know**
  - HCW: 1%
  - Unit Mgr: 0%
  - Hospital Mgr: 6%
Knowledge, Practices, & Beliefs

The health and safety of workers is a high priority with the management.
Strengths of survey

• Excellent participation by hospitals, HCWs and managers
• Facilities representative of all CA acute care hospitals
• Support from California Hospital Association and major HCW unions
• Cooperative and interested infection control practitioners
Limitations of survey

• Limited number of facilities due to resources and timeline
• Unable to survey other hospital workers (housekeeping, food services) and evening/night shift workers
• Plan to observe N95 use during patient care activities limited by delay in field data collection and low H1N1 patient numbers
Overall conclusions

- All hospitals implemented N95 respirator use for H1N1
- Shared knowledge, practices and beliefs about use and need for N95s
- Most components of RPP present
- Improvements needed in assessment of respirator use and respirator program evaluation
Follow-up activities

• Revision/modification/improvement of methods with five regional surveys during 2010-2011 flu season (NIOSH)

• Materials development and evaluation of respirator programs in survey hospitals (NIOSH/California)