

This proposed guidance reflects the current thinking on the stockpiling of respirators and facemasks for the purpose of pandemic influenza preparedness. The information contained in this document is distributed solely for the purpose of pre-dissemination public comment. It has not been formally disseminated by DOL. It does not represent and should not be construed to represent any agency determination or policy.

## **Proposed Guidance on Workplace Stockpiling of Respirators and Facemasks for Pandemic Influenza**

### **Introduction:**

In the event of an influenza pandemic, employers will play a key role in protecting employees' health and safety as well as in limiting the impact on the economy and society. Employers will likely experience employee absences, changes in patterns of commerce and interrupted supply and delivery schedules. To further preparedness efforts, the Department of Labor (DOL) proposes to publish this information on stockpiling respirators and facemasks in occupational settings as an appendix to the DOL and the Department of Health and Human Services (HHS) jointly issued *Guidance on Preparing Workplaces for an Influenza Pandemic* (February 2007). This proposed guidance is designed to encourage employers in the private and public sectors to purchase and stockpile facemasks and respirators in advance of an influenza pandemic, because manufacturing capacity at the time of an outbreak would not meet the expected demand for respiratory protection devices during the pandemic. Through advanced planning and stockpiling, employers will be able to better protect their employees as well as lessen the impact of a pandemic on their business, society, and the economy.

As is explained in more detail in this guidance, employers should consider stockpiling facemasks and respirators. More specifically, it is recommended that employees at very-high risk and high risk of exposure to pandemic influenza use respirators, while employees at medium risk of exposure use facemasks. Neither facemasks nor respirators are recommended for employees at lower risk of exposure to pandemic influenza.

This guidance is advisory in nature and informational in content. It is not a standard or a regulation, and it neither creates new legal obligations nor alters existing obligations created by OSHA standards or the Occupational Safety and Health Act (OSH Act). Pursuant to the OSH Act, employers must comply with safety and health standards as issued and enforced either by OSHA or by an OSHA-approved State Plan. In addition, Section 5(a)(1) of the OSH Act, the General Duty Clause, requires employers to provide their employees with a workplace free from recognized hazards likely to cause death or serious physical harm. Employers can be cited for violating the General Duty Clause if there is a recognized hazard and they do not take reasonable steps to prevent or abate the hazard. However, failure to implement any specific recommendations in this guidance is not, in itself, a violation of the General Duty Clause. Citations can only be based on standards, regulations, or the General Duty Clause.

## **Pandemic Influenza and the Workplace:**

For most employers, protecting their employees during an influenza pandemic will depend on emphasizing proper hygiene (cleaning hands and decontaminating surfaces) and practicing social distancing. Social distancing means reducing the frequency, proximity, and duration of contact between people (both employees and customers) to reduce the chances of spreading pandemic influenza virus from person-to-person. There are additional protective measures, including engineering changes, procedure changes, and the use of personal protective equipment, which employers and employees can implement based upon the occupational exposure risk profile of their job tasks in the work place. Use of respiratory protection (respirators) and barrier protection (facemasks) are components of a comprehensive plan to prepare workplaces for an influenza pandemic.

To assist employers in preparing for a pandemic, DOL and HHS have issued *Guidance on Preparing Workplaces for an Influenza Pandemic* ([www.osha.gov/Publications/influenza\\_pandemic.html](http://www.osha.gov/Publications/influenza_pandemic.html)). That document, referred to here as “*Preparing Workplaces*” provides information that employers and employees can use to evaluate their workplace and reduce the risk of being exposed to the pandemic influenza virus. DOL has also developed a guidance document to help healthcare employers protect their employees during an influenza pandemic: *Pandemic Influenza Preparedness and Response Guidance for Healthcare Workers and Healthcare Employers* can be found at <http://www.osha.gov/Publications/3328-05-2007-English.html>. It is important to note that in addition to occupational exposure risks, employees will also have non-occupational exposure risks. Such non-occupational exposure risks could include commuting to and from work on public transportation (e.g., bus or train) or other community exposures (e.g. shopping). By addressing non-occupational exposure risks, employers and employees can minimize the chances of an employee bringing illness into the workplace. Additional information on strategies to reduce community exposures to pandemic influenza can be found on [www.pandemicflu.gov](http://www.pandemicflu.gov)

Employee risks of occupational exposure to influenza during a pandemic may vary from very high to high, medium, or lower (caution) risk. The level of risk depends in part on whether or not jobs require close proximity to people potentially infected with the pandemic influenza virus, or whether they are required to have either repeated or extended contact with individuals or groups.

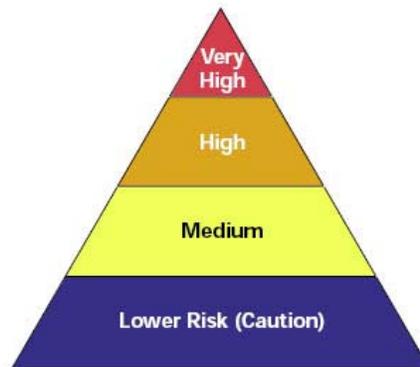
- Very high exposure risk occupations are those with high potential exposure to *high concentrations* of known or suspected sources of pandemic influenza during specific medical or laboratory procedures.
- High exposure risk occupations are those with high potential for exposure to known or suspected sources of pandemic influenza virus.

- Medium exposure risk occupations include jobs that require frequent, close contact (within 6 feet) exposures to known or suspected sources of pandemic influenza virus such as coworkers, the general public, outpatients, school children or other such individuals or groups.
- Lower exposure risk (caution) occupations are those that do not require contact with people known to be infected with the pandemic virus, nor frequent close contact (within 6 feet) with the public. Even at lower risk levels, however, employers should be cautious and develop preparedness plans to minimize employee infections.

Employers of critical infrastructure and key resource employees (such as law enforcement, emergency response, or public utility employees) may consider upgrading protective measures for these employees beyond what would be suggested by their exposure risk due to the necessity of such services for the functioning of society as well as the potential difficulties in replacing them during a pandemic (for example, due to extensive training or licensing requirements).

To help employers determine appropriate work practices and precautions, OSHA has divided workplaces and work operations into four risk zones, according to the likelihood of employees' occupational exposure to pandemic influenza. We show these zones in the shape of a pyramid to represent how the risk will likely be distributed. The vast majority of American workplaces are likely to be in the medium exposure risk or lower exposure risk (caution) groups.

## Occupational Risk Pyramid for Pandemic Influenza



### Very High Exposure Risk:

- Healthcare employees (for example, doctors, nurses, paramedics, or dentists) performing aerosol-generating procedures on known or suspected pandemic patients (for example, cough induction procedures, tracheal intubations, bronchoscopies, some dental procedures, or invasive specimen collection).
- Healthcare or laboratory personnel collecting respiratory tract specimens from known or suspected pandemic patients.

### High Exposure Risk:

- Healthcare delivery and support staff exposed to known or suspected pandemic patients (for example, doctors, nurses, and other hospital staff that must enter patients' rooms).
- Staff transporting known or suspected pandemic patients (for example, emergency medical technicians).
- Staff performing autopsies on known or suspected pandemic patients.

### Medium Exposure Risk:

- Employees with high-frequency contact with the general population (such as schools, high population density work environments, and some high volume retail).

### Lower Exposure Risk (Caution):

- Employees who have minimal occupational contact with the general public and other employees (for example, office employees).

After discussing the relative advantages and disadvantages of respiratory protection options, we will propose guidance for estimating facemask and respirator usage during a pandemic for workplaces in each of these exposure risk zones.

## Facemasks and Respirators:

As employers evaluate their workplace, facemasks and respirators are the two types of protection that should be considered for use in occupational settings during an influenza pandemic. While the degree of protection offered by these devices in a pandemic environment is uncertain at this time, use of these devices during an influenza pandemic is a recommended part of a comprehensive strategy of personal protection.

### Facemasks:

Facemasks are used as a physical barrier to protect employees from hazards such as splashes of large droplets of blood or body fluids. Facemasks also prevent contamination by trapping large particles of body fluids that may contain bacteria or viruses when they are expelled by the wearer (for example, through coughing or sneezing). Facemasks are cleared by the FDA and are legally marketed in the United States for use in disease prevention. FDA-cleared masks have been tested for their ability to resist blood and body fluids. Facemasks are not designed or certified to prevent the inhalation of small airborne contaminants. The term “facemask” is used in this guidance to refer to Food and Drug Administration (FDA) - cleared surgical, medical, procedure, dental, laser and isolation masks.

### Respirators:

Respirators are used to reduce an employee's exposure to airborne contaminants. Most respirators are designed to fit the face and to provide a tight seal between the respirator's edge and the face. 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 in the seal between the face and respirator. A “fit test” is necessary for most models of respirators because it is the only way to know for certain whether a proper seal can be established between the respirator and the user's face. The advantages and disadvantages of respirators as compared to facemasks are described in Table 1. In some workplaces, respirators will be an important component of protecting employees and allowing them to perform essential work, particularly work that may put them at greater risk for exposure to pandemic influenza. When the use of a respirator is necessary to protect employees from an occupational hazard, the respirator must be used in the context of a comprehensive respiratory protection program established by the employer (see OSHA standard 29 CFR 1910.134, or [www.osha.gov/SLTC/respiratoryprotection/index.html](http://www.osha.gov/SLTC/respiratoryprotection/index.html)).

Air purifying respirators are the type of respiratory protection recommended to reduce exposure risk to pandemic influenza in certain occupational settings. Air purifying respirators can be divided into several types. Each of these is described below; Table 1 provides a comparison of these respirator types.

- *Disposable or filtering facepiece respirators* are a type of respiratory protection in which the entire respirator facepiece is comprised of filter material. The most commonly used filtering facepiece respirator is made with material certified to meet the N95 filtration requirements. It is important to note that other National Institute for Occupational Safety and Health (NIOSH)-certified N-, R-, or P-filtering facepiece respirators (e.g., N99, R95, and P100) provide an equivalent or greater level of exposure reduction to airborne particulates as an N95 and can be

used if N95s are not available. Some filtering facepiece respirators have an exhalation valve which can reduce breathing resistance, reduce moisture buildup inside the respirator and increase work tolerance and comfort for respirator users. However, respirators with exhalation valves should not be used when there is a need to protect others from possible contamination by the respirator wearer (e.g., a healthcare provider performing surgical or other sterile medical procedures or a person with known or suspected pandemic influenza who could transmit infection to others).

- *Surgical respirators* are a type of respiratory protection designed for certain healthcare work environments that offers the combined protective properties of both a filtering facepiece respirator and a facemask. Surgical N95 respirators are certified by NIOSH as respirators and are also facemasks cleared by FDA as medical devices.
- *Reusable elastomeric respirators* are a type of respiratory protection that has a flexible, rubber-like facepiece with either permanent or removable filter cartridges. The facepiece can often be cleaned, repaired and reused, and the filter cartridges can be discarded and replaced when they become unsuitable for further use. Other elastomeric respirators with permanent filter cartridges are designed to be disposed of when the cartridges need to be replaced.
- *Powered air purifying respirators (PAPRs)* are a type of respiratory protection in which a battery-powered blower pulls air through filters that trap particles (including those containing viruses and bacteria) that may be present, and then moves the filtered air to the wearer's facepiece or hood. PAPRs are significantly more expensive than other air purifying respirators but they provide higher levels of protection against airborne particulates. It should also be noted that there are hooded PAPRs that do not require employees to be fit tested in order to use them. Additionally, a PAPR blower unit and battery can be shared by employees (who need protection at different times) who can each have their own reusable hood. A PAPR could be assigned to an individual person, to a staff position (e.g. a floor nurse position staffed by several employees over the course of a week), or to a location such as a treatment room or mobile treatment cart used for aerosol-generating medical procedures. Consequently, several approaches can be used to limit the number of PAPRs that an employer would purchase for pandemic preparedness, as long as proper decontamination procedures are followed between uses or users.

### **Replacing Disposable Respirators:**

Disposable respirators are designed to be disposed after use. Once worn in the presence of an infectious individual, the respirator should be considered potentially contaminated with infectious material. Touching the outside of the device should be avoided to prevent self-inoculation (touching the contaminated respirator and then touching one's eyes, nose, or mouth). It should be noted that a once-worn respirator will also be contaminated on its inner surface by the microorganisms present in the exhaled air and oral secretions of the wearer.

In the above scenario, users should discard respirators when they become unsuitable for further use due to excessive breathing resistance (e.g., particulate clogging the filter), unacceptable contamination/soiling, or physical damage. In the context of pandemic influenza, some have proposed reusing disposable respirators for prolonged periods of time (e.g., weeks or months) in the event supplies are limited. However, data on decontamination and/or safe reuse of respirators for infectious diseases are currently not available. Although filtering facepiece respirators have been reused during public health crises in resource-limited settings, the safety and efficacy of this approach has yet to be confirmed. It is not possible to give definitive guidance on the safety or efficacy of reuse or decontamination of disposable respirators. In the interim, plans should be based on single use of equipment according to manufacturers' instructions, FDA label claims, and NIOSH user instructions. Respirator users should not attempt to decontaminate filtering facepiece respirators as it may create a health hazard for the user and it may render the respirator ineffective in providing respiratory protection. Reuse may increase the potential for contamination through contact transmission. The risk of contaminating the inside of the respirator through improper handling must be weighed against the need to provide respiratory protection.

Thus, in preparing for an influenza pandemic, employers who anticipate providing respiratory protection to employees for the duration of the pandemic could instead consider using *reusable* respirators that are designed to be cleaned, repaired and reused. Information on proper cleaning and maintenance of respirators (both elastomeric respirators and PAPRs) is model specific and provided by the manufacturer as part of the NIOSH-certified user instructions. Purchasing reusable respirators also may reduce or eliminate the impact of potential shortages of filtering facepiece respirators and may be more cost effective over the duration of the pandemic. If an employer chooses to use reusable elastomeric respirators, the employer should take into account the initial training needed to teach employees how to properly clean such respirators as well as the time needed for employees to clean the respirators after use.

### **Replacing Elastomeric Respirator and PAPR Filters:**

In the case of elastomeric respirators and PAPRs, the respirator body and PAPR case is designed to be decontaminated and reused in accordance with the manufacturer's use instructions. If the filters are used in an environment where pandemic influenza is the sole air contaminant of concern, then the filters should last a long time if they are not physically damaged or soiled and are handled appropriately to control risk of contamination. In most workplaces, two to three filter sets should last for the duration of the pandemic. However, in certain work environments where there is a significant potential for physical damage or soiling of the filters (e.g., with blood or body fluids), employers may want to stockpile additional filter sets to ensure adequate protection of their employees for the duration of a pandemic.

The following table summarizes the forgoing information about the advantages and disadvantages of facemasks and of the specific types of respirators previously described, as well as providing rough cost estimates. Employers may find this summary helpful in considering purchasing options for fulfilling the specific recommendations addressed in the remainder of this guidance

**Table 1: Advantages and Disadvantages of Respirators and Facemasks**

Device	Unit Cost*	Advantages	Disadvantages
<b>Facemasks</b>	\$0.12-0.20	<ul style="list-style-type: none"> <li>Reduces exposure to splashes of large droplets.</li> <li>Tested for fluid resistance.</li> <li>Easier to breathe through than a respirator.</li> </ul>	<ul style="list-style-type: none"> <li>Does <u>not</u> reduce exposure to small inhalable particles.</li> <li>Cannot be decontaminated, may be shortages during a pandemic.</li> <li>Not designed to form a seal to the face.</li> </ul>
<b>N95 respirator (filtering facepiece)</b>	\$0.50-1.20	<ul style="list-style-type: none"> <li>Reduces exposure to small inhalable particles and large droplets.</li> <li>Designed to form a tight seal to the face.</li> <li>Filtration efficiency certified.</li> </ul>	<ul style="list-style-type: none"> <li>Cannot be decontaminated, may be shortages during a pandemic.</li> <li>Must be fit-tested to assure full protection.</li> <li>Cannot be worn with facial hair that interferes with the seal between the face and respirator.</li> <li>Harder to breathe through than a facemask.</li> <li>Not designed to be used in surgery.</li> </ul>
<b>N95 respirator w/ exhalation valve (filtering facepiece)</b>	\$1.30-3.00	<ul style="list-style-type: none"> <li>Reduces exposure to small inhalable particles and large droplets.</li> <li>Designed to form a tight seal to the face.</li> <li>Filtration efficiency certified.</li> <li>Exhalation valve makes it easier to exhale and reduces moisture buildup inside the facepiece compared to other filtering facepiece respirators.</li> </ul>	<ul style="list-style-type: none"> <li>Cannot be decontaminated, may be shortages during a pandemic.</li> <li>Must be fit-tested to assure full protection.</li> <li>Cannot be worn with facial hair that interferes with the seal between the face and respirator.</li> <li>Harder to breathe through than a facemask.</li> <li>Should not be used when others must be protected from contamination by the wearer.</li> <li>Not designed to be used in surgery.</li> </ul>
<b>Surgical respirator (filtering facepiece)</b>	\$1.00-1.10	<ul style="list-style-type: none"> <li>Reduces exposure to small inhalable particles <u>and</u> splashes of large droplets that would require a facemask.</li> <li>Designed to form a tight seal to the face.</li> <li>Filtration efficiency certified.</li> <li>Tested for fluid resistance, biocompatibility, and flammability rated.</li> </ul>	<ul style="list-style-type: none"> <li>Cannot be decontaminated, may be shortages during a pandemic.</li> <li>Must be fit-tested to assure full protection.</li> <li>Cannot be worn with facial hair that interferes with the seal between the face and respirator.</li> <li>Harder to breathe through than a facemask.</li> <li>Limited availability compared to other filtering facepiece respirators.</li> </ul>
<b>Elastomeric respirator (flexible, rubber-like facepiece)</b>	Facepiece \$10-40 Filters \$2-10	<ul style="list-style-type: none"> <li>Reduces exposure to small inhalable particles and large droplets.</li> <li>Designed to form a tight seal to the face.</li> <li>Filtration efficiency certified.</li> <li>Can be decontaminated &amp; reused, can reduce/eliminate the impact of potential N95 shortages.</li> <li>Higher initial cost, but may be more cost effective than filtering facepieces for longer term use.</li> <li>Filters are replaceable.</li> <li>After decontamination, respirators can be used by different individuals.</li> <li>Full facepiece type provides eye protection.</li> <li>Full facepiece type provides a higher level of protection than a half facepiece type.</li> </ul>	<ul style="list-style-type: none"> <li>Must be fit-tested to assure full protection.</li> <li>Cannot be worn with facial hair that interferes with the seal between the face and respirator.</li> <li>Harder to breathe through than a facemask.</li> <li>May interfere with voice communication.</li> <li>Requires cleaning and disinfection between uses.</li> <li>Should not be used when others must be protected from contamination by the wearer.</li> </ul>
<b>Powered Air-Purifying Respirator (PAPR) (head/face covering with battery powered blower unit)</b>	PAPR \$400-1,200 Spare battery \$120-200 Extra hood \$75-100 Filters \$20-35	<ul style="list-style-type: none"> <li>Reduces exposure to small inhalable particles.</li> <li>Provides greater level of protection than filtering facepiece or elastomeric respirators.</li> <li>Filtration efficiency certified.</li> <li>Can be decontaminated &amp; reused, can reduce/eliminate the impact of potential N95 shortages.</li> <li>Hooded PAPRs do not need to be fit tested and can be worn with facial hair.</li> <li>Reduces/eliminates breathing resistance and moisture buildup inside the facepiece/hood.</li> <li>Filters are replaceable.</li> <li>After decontamination, PAPRs can be used by different individuals.</li> <li>Full facepiece type provides eye protection.</li> </ul>	<ul style="list-style-type: none"> <li>Significantly more expensive than other respirators.</li> <li>Blower unit/battery typically worn on belt (weighs 1.5-3 lbs.).</li> <li>On some units, fan noise can make communication and medical care delivery more difficult.</li> <li>Requires cleaning and disinfection between uses.</li> <li>Should not be used when others must be protected from contamination by the wearer.</li> </ul>

\* Cost estimates are current as of publication and intended only for planning purposes. Actual pricing will vary depending on the make, model and quantity of respiratory protection devices selected.

### **Estimating Employee's Occupational Exposure Status:**

The best method for assessing the number of employees at risk of occupational exposure and their particular level(s) of risk is for the employer to evaluate the workplace and develop a site-specific pandemic influenza plan. Then, the employer should assess the occupational exposure risk for each job classification and specific work tasks (for example, aerosol-generating medical procedures). Once an employer has classified jobs and tasks into very high, high, medium, and lower exposure risk categories, she/he should then estimate the number or percentage of employees who fall into each category.

For example, not all hospital-based healthcare workers provide direct patient care. In addition changes in work practices during a pandemic (such as the cohorting or grouping of patients with pandemic influenza to reduce the number of healthcare workers and non-pandemic patients who may be exposed to pandemic patients) may further affect the number of persons with high risk exposures. In addition, a single employee may at times be at low risk whereas at other times they may have medium or high risk exposures. For example, a law enforcement officer's risk would be different when patrolling in a car (low risk), interacting with persons in the community (medium risk) or transporting someone who may be ill with pandemic influenza (high risk).

### **Respirator and Facemask Planning Assumptions:**

We recognize that the number of employees with occupational exposure is difficult to predict because of uncertainty of the size or scale of an influenza pandemic. However, using the assumptions listed below, Table 2 provides rough estimates of the percentage of employees potentially exposed to pandemic influenza and their potential respiratory protection needs for some specific occupational sectors.

- Employers and employees should plan for a pandemic assuming community mitigation interventions (e.g., isolation of cases, voluntary quarantine of case household members, potentially closing schools and canceling other public gatherings, and social distancing) are effective at reducing the pandemic illness rate in communities to about 15%. A mitigated pandemic is currently expected to occur in two waves; community outbreaks in each wave would each last up to 12 weeks in duration (24 weeks total). There are assumed to be five work days per week and thus 120 work days per employee over the two pandemic waves.
- If pandemic vaccine is available and used, an employee's vaccination status will not modify recommendations for the use of respirators and facemasks because vaccines may not be completely effective and will not be available in large supply at the start of a pandemic.
- Respirators and facemasks will only be used by employees during pandemic waves in their local community/state and not between pandemic waves, and only

during work tasks where they might be exposed to people who are or might be ill with pandemic influenza.

These same planning assumptions underlie the estimates of respirator and facemask usage for planning and stockpiling purposes provided in the subsequent sections of this proposed guidance.

**Table 2: Stockpiling Estimates for Respirators and Facemasks**

Occupational setting	Proportion of medium or higher risk employees	Number of respirators or facemasks per employee per work shift		Number of respirators or facemasks per employee for a pandemic (120 work days)	
		N95 Respirators (high or very high risk)	Facemasks (medium risk)	N95 Respirators (high or very high risk)	Facemasks (medium risk)
Healthcare					
Hospital <sup>1</sup>	33%	4 <sup>2</sup>	0	480	0
Outpatient office/clinic	67%	4	0	480	0
Long term care	25%	1	3	120	360
Home healthcare	90%	2	4	240	480
Emergency medical services	100%	8	0	960	0
First responders					
Law enforcement	90%	2	2	240	240
Corrections	90%	1	3	120	360
Fire department (non-EMS, career and volunteer)	90%	2	2	240	240
Medium risk employees	See Note <sup>3</sup>	0	2	0	240

<sup>1</sup> In hospital settings, it is expected that known or suspected pandemic influenza patients will be cohorted (i.e., pandemic patients share rooms only with others pandemic patients in order to reduce the exposure risk to non-pandemic patients; cohorting patients may also include designating specific areas such as a hospital floor or wing for pandemic patient care). Through the cohorting of patients, hospitals are also expected to reduce the number of healthcare providers and support staff who might be exposed to pandemic influenza and thus reduce the number of employees who will need respirators.

<sup>2</sup> Four respiratory protection devices per shift is the estimate used for most healthcare and emergency response settings where employees are in contact throughout the shift with pandemic influenza patients. For example, employees might use one respirator from the start of the shift until a mid-morning break, a second respirator from the break until lunch, a third respirator from lunch to a mid-afternoon break, and the fourth respirator from the mid-afternoon break until the end of the work shift. If the work flow is not conducive to regular breaks, it may be necessary to modify the estimates used to determine stockpiling recommendation. In the following sections, formulas are provided to calculate respirator stockpiling needs for very high and high exposure risk employees. These formulas can be adapted to a specific workplace by substituting estimates of daily

respirator needs that are tailored to the work flow and schedule in your place of employment.

<sup>3</sup> Includes employees in various retail and other settings where frequent and close contact with other people, whose pandemic infection status is unknown, is unavoidable. The purpose of this estimate is for purchasing and stockpiling of respirators and facemasks. During an actual pandemic the distribution of employees exposed at each risk level, and the distribution of respirators and facemasks necessary to protect employees will likely be less at the beginning and end of a pandemic wave and greater during the middle of a wave. These estimates are intended to provide an average over the duration of the pandemic in the absence of a work site-specific pandemic influenza plan.

### **Estimating Respirator Usage in Workplaces Classified at Very High Exposure Risk for Pandemic Influenza:**

#### *Employees Covered:*

- Healthcare employees performing aerosol-generating procedures on known or suspected pandemic influenza patients; and
- Healthcare or laboratory personnel collecting respiratory tract specimens from known or suspected pandemic influenza patients.

Respirators are recommended to protect healthcare workers performing aerosol-generating medical procedures on patients known or suspected to be infected with pandemic influenza as well as certain laboratory personnel. Although a reduction in the level of exposure can be provided by a filtering facepiece respirator (e.g., N95, N95 surgical respirator), a reusable elastomeric respirator or a powered air purifying respirator (PAPR) will provide a further reduction in the level of exposure.

If using disposable N95 or surgical respirators for aerosol-generating medical procedures, healthcare institutions should estimate the total number of such procedures that the facility might reasonably expect to perform during in a severe pandemic and the average number of employees involved in each procedure. Employers should plan on stockpiling:

1 N95 respirator per employee per aerosol-generating procedure.

If using elastomeric respirators for aerosol-generating medical procedures, healthcare institutions should estimate:

1 elastomeric respirator with 3 or more sets of filters per employee, depending on frequency of use.

If using PAPRs for aerosol generating medical procedures, healthcare institutions should estimate:

- The number of patients on which aerosol-generating medical procedures might reasonably be expected to be performed at a given time (e.g., number of treatment rooms or mobile treatment carts).
- The maximum number of healthcare workers (HCWs) expected to be involved in the aerosol-generating medical procedure (for example, four healthcare workers might be involved in the procedure – a treating physician, a nurse, an anesthesiologist, and a respiratory therapist).

For example:

1 patient/treatment room X 4 HCWs/patient = 4 PAPRs per treatment room + 4-8 sets of filters per PAPR (changing filters every 15-30 pandemic work days, depending on frequency of use).

When PAPRs are used in the workplace, it is possible for several employees to share a single PAPR blower unit and battery. For example, if a hospital employs 5 healthcare workers to provide continuous coverage of a single staff position (e.g., a nurse) over the course of a week, they might purchase 1 blower unit, 2 batteries (one is a spare for recharging while other is in use), and 5 reusable hoods in order to protect the 5 employees.

Note: PAPRs and elastomeric respirators may also be used for other patient care activities normally covered under the high risk section of this document.

### **Estimating Respirator Usage in Workplaces Classified at High Exposure Risk for Pandemic Influenza:**

*Employees Covered:*

- Healthcare delivery and support staff working closely with (either in direct contact or within 6 feet of) people known or suspected to be infected with pandemic influenza virus.
- Staff transporting patients who are known or suspected to be infected with pandemic influenza virus (for example, emergency medical technicians).
- Staff performing autopsies on known or suspected pandemic patients.

Respirators are recommended to protect employees working closely with people/patients known or suspected to be infected with pandemic influenza. Such protection can be accomplished by a disposable filtering facepiece (e.g., N95, surgical respirator), a reusable elastomeric respirator or a powered air purifying respirator (PAPR).

If using disposable N95 or surgical respirators to protect healthcare delivery and support staff, employers should plan for:

4 N95s/HCW/shift X 120 pandemic workdays = 480 N95s per exposed HCW.

If using disposable N95 or surgical respirators to protect emergency medical service providers who treat/transport patients that are known or suspected to be infected with pandemic influenza, employers should plan for:

$$8 \text{ N95s/EMT/shift} \times 120 \text{ pandemic workdays} = 960 \text{ N95s.}$$

The stockpiling recommendation for emergency medical service providers is noticeably higher than for other work environments and is based upon their dynamic and uncontrolled work environment. Employers may consider revising this estimate based upon work volume (e.g., municipalities with high patient volume may need more N95s while those with lower patient volume may need fewer respirators).

If using elastomeric respirators for employees at high exposure risk (either healthcare workers or emergency medical service providers), employers should estimate:

$$1 \text{ reusable elastomeric respirator} + 3 \text{ sets of filters per exposed employee.}$$

If using PAPRs for employees at high exposure risk (either healthcare workers or emergency medical service providers), employers should estimate:

$$1 \text{ PAPR per exposed employee} + 3 \text{ sets of filters per exposed employee.}$$

### **Example of Stockpiling Needs and Comparative Costs for a Single High Exposure Risk Employee**

As previously discussed in *Table 1: Advantages and Disadvantages of Respirators and Facemasks*, each type of respirator offers different advantages and disadvantages that may aid in selecting an appropriate respirator for the work environment. Below is a comparison of three different options for providing respiratory protection and estimates of cost for each option.

#### Option 1 - Using disposable N95 respirators:

$$480 \text{ N95s} @ \$0.50/\text{respirator} = \$240 \text{ per employee protected}$$

#### Option 2 - Using reusable elastomeric respirators:

$$1 \text{ respirator} @ \$25 + 3 \text{ sets of filters} @ \$5 \text{ set} = \$40 \text{ per employee protected}$$

#### Option 3 - Using 1 PAPRs shared by 4 employees on shift work:

$$1 \text{ PAPR} @ \$800 + 1 \text{ spare battery} @ \$160 + 3 \text{ extra hoods} @ \$90 \text{ each} + 3 \text{ sets of filters} @ \$30 \text{ set} = \$1,320 / 4 \text{ employees} = \$330 \text{ per employee protected}$$

(Note: hooded PAPRs do not need to be fit tested which can result in other programmatic cost savings)

## Estimating Facemask Usage for *Patients* in Workplaces Classified at High Exposure Risk for Pandemic Influenza:

Healthcare providers should consider distributing facemasks to patients with influenza-like illness as a component of an overall pandemic influenza containment strategy. The number of facemasks stockpiled for such purposes are in addition to the numbers presented above for employees' health and safety.

During periods of pandemic influenza activity in the community, facemasks should be offered as part of a respiratory hygiene/cough etiquette strategy to patients who are coughing and/or sneezing, have a fever or have other symptoms of influenza-like illness when they present for health-care services (for more information see [Interim Guidance for the Use of Masks to Control Influenza Transmission](http://www.cdc.gov/flu/professionals/infectioncontrol/maskguidance.htm) [www.cdc.gov/flu/professionals/infectioncontrol/maskguidance.htm](http://www.cdc.gov/flu/professionals/infectioncontrol/maskguidance.htm)).

If tolerated, facemasks should be worn by these patients until:

1. It is determined that the patient does not have either pandemic influenza or another respiratory infection that requires [isolation precautions](#) to prevent respiratory droplet transmission; or
2. The patient has been appropriately isolated, either by placement in a private room or by placement in a room with other patients with the same infection (i.e., cohorting). Once isolated, the patient does not need to wear a facemask unless transport outside the room is necessary.

**Table 3:** *Stockpiling Estimates for Facemasks for Use by Ill Patients*

Occupational setting	Facemasks needed
<b>Healthcare</b>	
Hospital (inpatient) <sup>4</sup>	2 per patient per day
Essential visitors <sup>5</sup>	3 per visitor per day
Emergency Rooms <sup>6</sup>	1 per ill person
Outpatient office/clinic	2 per patient visit
Long term care	1 per patient per day
Home healthcare	1 per patient visit
Emergency medical services	1 per ill person
<b>First responders</b>	
Law enforcement	1 per ill person
Corrections	2 per ill inmate per day
Fire department (non-EMS, career and volunteer)	1 per ill person

<sup>4</sup> Primary use will be when transporting patients to/from and outside of their room.

<sup>5</sup> “Essential” visitors may include parents of pediatric patients who need to stay with the patient in their room but will not apply to visitors of all patients. Hospitals will likely encourage social distancing during an influenza pandemic and may restrict visitors to only those deemed “essential.”

<sup>6</sup> Projections for stockpiling respiratory protective devices for emergency room or urgent care setting patients should be based on the need to provide a facemask for every patient who is coughing, sneezing or has a fever or other symptoms of influenza-like illness (ILI) when they present for health-care services. Based upon experience with seasonal influenza, only approximately 1/3 of patients presenting with ILI are confirmed to have influenza.

When estimating the number of facemasks to stockpile for use by ill persons in a pandemic, consider estimating facemasks per ill patient per day for patients in hospitals (including possible essential visitors), long term care facilities and correctional facilities. When estimating the number of facemasks per patients encountered in other settings (e.g. in emergency rooms, outpatient offices or clinics, home healthcare, emergency services settings and by law enforcement and fire personnel), the stockpile should be sufficient to provide facemasks for each ill individual encountered.

### **Estimating Facemask or Respirator Usage in Workplaces Classified at Medium Exposure Risk for Pandemic Influenza:**

#### *Employees Covered:*

- Employees with high-frequency close contact (within 6 feet) with the general population.

Facemasks are recommended to protect employees with high-frequency close contact with the general public from sprays of potentially infectious liquid droplets (from talking, coughing, or sneezing). Employers should plan for:

2 facemasks/employee/shift X 120 pandemic workdays = 240 facemasks per exposed employee.

Alternatively, employers may choose to provide respirators if there is an expectation of close contact with people who have symptomatic influenza infection or if the employer chooses to provide protection against the risk of airborne influenza transmission. For example, employers in critical infrastructure or key resource industry sectors (e.g., utilities or banking) may consider providing a higher level of protection based upon the essential nature of their services or the difficulty of replacing employees whose job requires extensive training or licensing. In such cases, employers should plan for:

2 N95s/employee/shift X 120 pandemic workdays = 240 N95s per exposed employee;

or

1 reusable elastomeric respirator + 3 sets of filters per employee.

While PAPRs would certainly be acceptable to use instead of an N95 or elastomeric respirator, they may be considered costly in the medium exposure risk work environment.

**Estimating Facemask or Respirator Usage in Workplaces Classified at Lower Exposure Risk (Caution):**

Facemasks and respirators are not recommended in lower exposure risk work environments.

**Stockpile Management:**

When stockpiling items, be aware of each product's shelf life and storage conditions. Stockpiles of supplies should be placed in clean, secure, temperature-controlled environments to prevent damage or contamination of the supplies (e.g., avoid storage areas that are damp or have temperature extremes). Where possible, incorporate product rotation (e.g., consume the oldest supplies first) into your stockpile management system. Surgical masks may or may not have expiration dates listed; however, product shelf-life should be taken into consideration to assure adequate inventory of supplies.

DRAFT