Hospital Respiratory Protection Program Toolkit

Resources for Respirator Program Administrators

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NIOSH National Institute for Occupational Safety and Health

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This guidance document is not a standard or regulation, and it creates no new legal obligations. It contains recommendations as well as descriptions of mandatory safety and health standards. The recommendations are advisory in nature, informational in content, and are intended to assist employers in providing a safe and healthful workplace. The *Occupational Safety and Health Act* requires employers to comply with safety and health standards and regulations promulgated by OSHA or by a state with an OSHA-approved state plan. In addition, the Act's General Duty Clause, Section 5(a)(1), requires employers to provide their employees with a workplace free from recognized hazards likely to cause death or serious physical harm.

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Abbreviations Used in the Toolkit

AIHA	American Industrial Hygiene Association
AII	airborne infection isolation
AIIR	airborne infection isolation room
APF	assigned protection factor
APR	air-purifying respirator
ATD	aerosol transmissible disease
BMBL	Biosafety in Microbiological and Biomedical Laboratories
Cal/OSHA	California Department of Industrial Relations, Division of Occupational Safety and Health
CBRN	chemical, biological, radiological, and nuclear
CDC	Centers for Disease Control and Prevention
CNC	condensation nuclei counter
FDA	Food and Drug Administration
HCP	healthcare personnel
HE	high-efficiency
HEPA	high-efficiency particulate air
HICPAC	Healthcare Infection Control Practices Advisory Committee
MERS-CoV	Middle East Respiratory Syndrome coronavirus
MRSA	methicillin-resistant *Staphylococcus aureus*
MSSA	methicillin-susceptible *Staphylococcus aureus*
NIOSH	National Institute for Occupational Safety and Health
NPPTL	National Personal Protective Technology Laboratory
OSHA	Occupational Safety and Health Administration
PAPR	powered air-purifying respirator
PLHCP	physician or other licensed healthcare professional
PPE	personal protective equipment
RPA	respirator program administrator
RPP	respiratory protection program
SARS	severe acute respiratory syndrome
SARS-CoV	SARS-associated coronavirus
SCBA	self-contained breathing apparatus
TB	tuberculosis
VHF	viral hemorrhagic fever

Glossary

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 12 for a detailed explanation.

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

Airborne Precautions—A category of Transmission-Based Precautions that CDC and HICPAC may recommend when Standard Precautions alone are not sufficient to prevent the transmission of disease. When Airborne Precautions are required patients should be placed in airborne infection isolation rooms and healthcare personnel sharing patients' airspaces should wear respirators.

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 15 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.

Droplet Precautions—A category of Transmission-Based Precautions that CDC and HICPAC may recommend when Standard Precautions alone are not sufficient to prevent the transmission of disease. When Droplet Precautions are required, patients should be spatially separated, preferably in separate rooms with closed doors. Healthcare personnel should wear surgical masks for close contact and, if substantial spraying of body fluids is anticipated, gloves and gown as well as goggles (or face shield in place of goggles). Patients should be masked during transport.

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 and are cleared by the FDA for marketing. They may come with or without a face shield. Facemasks do not seal tightly to the wearer's face, do not provide the wearer with a reliable level of protection from inhaling smaller airborne particles, and are not considered respiratory protection.

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.

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

Fit factor—A quantitative estimate of the fit of a particular respirator to a specific individual; 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.

Healthcare Infection Control Practices Advisory Committee (HICPAC)—A federal 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. CDC and 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.

Healthcare personnel (HCP)—Paid and unpaid persons who provide patient care in a healthcare setting or support the delivery of healthcare by providing clerical, dietary, housekeeping, engineering, security, or maintenance services.

High-efficiency (HE) or high-efficiency particulate air (HEPA) filter—The NIOSH classification for a filter that is at least 99.97% efficient in removing particles and is used in powered air-purifying respirators (PAPRs). When high-efficiency filters are required for non-powered respirators, N100, R100, or P100 filters may be used.

Hood—The portion of a respirator that completely covers the head and neck, and may also cover portions of the shoulders and torso, and through which clean air is distributed to the breathing zone.

Loose-fitting facepiece—The portion of a respirator that forms a partial seal with the face but leaves the back of the neck exposed, is designed to form a partial seal with the face, and through which clean air is distributed to the breathing zone.

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 air-purifying respirator with NIOSH-approved N95 particulate filters or filter material (i.e., includes N95 filtering facepiece respirator or equivalent protection).

Negative-pressure respirator—A tight-fitting respirator in which air is inhaled through an air-purifying filter, cartridge, or canister during inhalational efforts, generating negative pressure inside the facepiece relative to ambient air pressure outside the respirator.

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. Examples of PPE include gloves, respirators, goggles, facemasks, surgical masks, faceshields, footwear, and gowns.

Physician or other licensed healthcare 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 healthcare services required to provide a medical evaluation as described in OSHA's Respiratory Protection standard.

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.

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 certified by NIOSH for the purpose for which they are used.

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

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.

Surgical mask—A loose-fitting, disposable type of facemask 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. Surgical masks do not seal tightly to the wearer's face, do not provide the wearer with a reliable level of protection from inhaling smaller airborne particles, and are not considered respiratory protection.

Surgical respirator—A filtering facepiece respirator with spray- or splash-resistant facemask material on the outside to protect the wearer from splashes. Also known as a surgical N95 respirator.

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.

Introduction to This Toolkit

This toolkit 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 healthcare personnel.

Healthcare personnel are paid and unpaid persons who provide patient care in a healthcare setting or support the delivery of healthcare by providing clerical, dietary, housekeeping, engineering, security, or maintenance services. Healthcare personnel may potentially be exposed to ATD pathogens. Aerosols are particles or droplets suspended in air. ATDs are diseases transmitted when infectious agents, 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, or infection control department. This toolkit is written as a practical manual that can be used by anyone charged with setting up and maintaining a hospital respiratory protection program. A respirator is a device worn over the nose and mouth to protect the wearer from hazardous materials in the breathing zone.

Photo: 3M

Photo: Haylard Health, Inc.

Filtering facepiece respirators being used in healthcare workplaces.

In healthcare, 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 to references, educational 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, but we have also collected many more that were produced by other organizations and are available on the Internet.

This toolkit identifies existing public health guidance where available on the use of respiratory protection. Scientific evidence is continuously evolving, particularly with regard to disease transmission. Precautionary use of respiratory protection may be prudent where scientific uncertainty exists.

Why Hospitals Need a Respiratory Protection Program

Respiratory Hazards in the Healthcare Setting

The hospital environment contains hazards such as bacteria, viruses, and chemicals that may be inhaled by personnel 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 we start with the most effective controls—the elimination of hazards or substitution of less hazardous processes, chemicals, or products. 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 reduce risk, most often by minimizing the extent or duration of the exposure, or reducing 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. Each facility should develop policies and procedures which address the control methods used at their institution.

The hazards associated with ATDs (e.g., infectious patients with a transmissible disease or, in rare situations, 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, healthcare facilities must implement comprehensive infection control plans utilizing a combination of engineering, administrative (including training and vaccination), and work practice controls, and provide for the use of respirators and other PPE.

Healthcare personnel who care for patients with ATDs must work in close proximity to the source of the hazard; 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 personnel, and others with a higher risk of exposure related to the tasks they perform (e.g., lab or autopsy workers), must often be protected further through the proper use of

Photo: Centers for Disease Control and Prevention

Airborne droplets visible during sneezing (photo enhanced).

FIGURE 1: EXAMPLES OF METHODS FOR CONTROLLING EXPOSURE TO AEROSOL TRANSMISSIBLE DISEASE PATHOGENS

Minimize the number of employees exposed	Minimize the amount of infectious aerosol in the air	Protect employees who must be exposed
• Isolate patients suspected or confirmed with tuberculosis 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 patients with a suspected or confirmed ATD. • Use closed suctioning systems to minimize the dispersion of aerosol.	• Provide vaccinations. • Use personal protective equipment (PPE) including respirators when caring for patients with measles (rubeola).

respirators. See Figure 1 above for some examples of methods used for controlling exposures to ATD pathogens in the healthcare setting.

Respiratory Protection Reduces Inhalation of Aerosols

In order to understand how respirators can be used to protect healthcare personnel, 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 healthcare 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 healthcare personnel,** 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 wearer's nose or mouth. In other instances, a facemask is worn by healthcare personnel 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 where sterile fields must be maintained, such as operating rooms.

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 into the breathing zone and respiratory tract of 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 wearer. **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, including those emitted into the room air by a patient who is exhaling or coughing, or generated during certain medical procedures**.

The purpose of a respirator **when worn by healthcare personnel,** for example a N95 filtering facepiece respirator, is typically to protect the wearer by reducing the concentration of infectious particles in the air inhaled by the wearer. These particles may come from infectious patients who are exhaling, talking, sneezing, or coughing in the rooms in which healthcare personnel are working; from medical procedures performed on infectious patients (e.g., using bone saws or performing bronchoscopies); or from laboratory procedures (e.g., operating centrifuges, blenders, or aspiration equipment) that may aerosolize pathogens.

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 (see the "Types of Respiratory Protection" section on page 15). For example, filtering facepiece respirators are designed to seal tightly to the face when the proper model and size is selected for the individual by 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 both large droplets and small infectious particles.

Photo: California Dept. of Public Health

Healthcare personnel wearing a surgical mask.

Photo: California Dept. of Public Health

Healthcare personnel wearing a filtering facepiece respirator.

Also available, and widely used in healthcare, 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"). See Figure 2 below for further comparison of surgical masks, filtering facepiece respirators, and surgical respirators.

FIGURE 2: SURGICAL MASKS, FILTERING FACEPIECE RESPIRATORS, AND SURGICAL RESPIRATORS

	Surgical Masks	Filtering Facepiece Respirators	Surgical Respirators
Intended use when: Worn by HCP[1]	Do not protect against small airborne particles (aerosols) Protect the patient and sterile field by reducing the number of particles introduced into the room as HCP talk, sneeze, or cough Protect the wearer's nose/mouth from splashes or sprays of large droplets of body fluids	Reduce HCP inhalation of both large droplets and small airborne particles (aerosols) Protect the patient by reducing the number of particles introduced into the room as HCP talk, sneeze, or cough	Reduce HCP inhalation of both large droplets and small airborne particles (aerosols) Protect the patient and sterile field by reducing the number of particles introduced into the room as HCP talk, sneeze, or cough Protect the wearer's nose/mouth from splashes or sprays of large droplets of body fluids
Worn by patient	Protect HCP by reducing the number of particles introduced into the room as a patient talks, sneezes, or coughs	Not typically worn by patients	Not typically worn by patients
Fit testing required?	No, not designed to seal to the face	Yes, to ensure adequate seal to the face	Yes, to ensure adequate seal to the face
Government oversight	FDA[2] clears for marketing	NIOSH[3] provides certification	NIOSH provides certification and FDA clears for marketing

[1] HCP = healthcare personnel
[2] FDA = United States Food and Drug Administration
[3] NIOSH = National Institute for Occupational Safety and Health

A two-page factsheet and a short video, in English and Spanish, on the differences between respirators and surgical masks are available from OSHA as training resources.

Multiple Approaches are Needed for Infection Prevention and Control

Infection prevention and control measures are intended to reduce the spread of disease between patients, healthcare personnel, and visitors. Examples of infection control measures include employee vaccination; hand hygiene; and replacement or cleaning, disinfection, and sterilization of surgical instruments, patient-care devices, uniforms, and PPE. Multiple approaches are often required since many controls reduce hazards without eliminating them and many controls are subject to failure.

An effective infection prevention and control program must provide for early hazard identification (i.e., which patients have ATDs?), assessment (i.e., are the diseases high-risk or is there an increased likelihood of infection?), and control (i.e., which controls and PPE are necessary?).

A coordinated approach to implementing multiple preventive controls is provided by the Centers for Disease Control and Prevention (CDC) Healthcare Infection Control Practices Advisory Committee's (HICPAC) *2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings*, which should be reviewed in its entirety by those responsible for infection control. The guideline describes Standard and Transmission-Based Precautions (discussed in more detail in the following section).

CDC and HICPAC state that transmission of an infectious disease requires three elements: a source of infectious agent, a susceptible host with a route of entry, and a mode of transmission. Standard Precautions are the foundation of infection control and represent the minimum infection prevention measures that apply to all patient care. They include practices such as hand hygiene, use of personal protective equipment (e.g., gloves, gowns, facemasks) depending on the anticipated exposure, cough etiquette, safe injection practices, and safe handling of potentially contaminated equipment or surfaces in the patient environment. Standard Precautions apply to all patients, clients, and staff, regardless of the presence of infectious agents, and are intended to reduce the risk of transmitting infections from known and unknown sources. When a patient is known or suspected to be infected and Standard Precautions are insufficient, CDC and HICPAC have prescribed one or more of three categories of Transmission-Based Precautions to eliminate or reduce the mode of transmission: Contact Precautions, Droplet Precautions, and Airborne Precautions.

Contact Precautions include the use of gloves and gowns to prevent the direct or indirect transmission of disease between patients and healthcare personnel. Droplet Precautions include the use of facemasks to prevent large droplets from travelling from the respiratory tract of a patient to the mucosal surfaces (i.e., nasal mucosa, conjunctivae, and, less frequently, the mouth) of the healthcare personnel and also include use of gloves, gowns, and eye protection if substantial spraying of body fluids is anticipated. Airborne Precautions reduce the risk of healthcare personnel inhaling small infectious airborne particles. Airborne Precautions require the use of respiratory protection.

Vaccination of healthcare personnel is another key component in preventing the transmission of diseases requiring Airborne and Droplet Precautions in hospitals. The CDC and some state and local health departments consider healthcare personnel to be at considerable risk for acquiring or transmitting ATDs including influenza, measles, mumps, rubella, pertussis, and varicella, and therefore recommend vaccination.

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

The *2007 CDC and HICPAC Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings* applies to healthcare 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 on pages 13-14). The 2007 CDC and HICPAC Guideline serves as a primary resource supporting respirator use policies in healthcare, supplemented by newer guidance issued by CDC, OSHA, public health departments, as well as by relevant scientific literature.

CDC and HICPAC have categorized each ATD by its mode of transmission (droplet or airborne) and specified the applicable Transmission-Based Precautions for that agent (i.e., Droplet or Airborne Precautions); see Figure 3 and Figure 4 on pages 9 and 11 for complete listings.

Photo: Haylard Health, Inc.

Healthcare personnel wearing a filtering facepiece respirator while checking a patient's vitals.

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

CDC and HICPAC describe the distinction between droplet transmission and airborne transmission based on particle size and the distance and time over which the pathogens remain infectious. CDC and HICPAC indicate 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 historically been used to define the area of risk when working with

patients suspected or known to have diseases requiring Droplet Precautions, CDC and HICPAC report that infection has occurred at distances greater than 3 feet. Thus, CDC and HICPAC state that observing Droplet Precautions at a distance up to 6 or 10 feet or upon entry into the patient's room may be prudent.

When **Droplet Precautions** are recommended, **surgical masks** function to reduce the transmission of large infectious droplets between the source (patient) and the mucosal surfaces of a susceptible host (healthcare personnel). When **Airborne Precautions** are recommended, **respirators and** other control measures, such as patient isolation in an **airborne infection isolation room (AIIR)** with specialized ventilation, are used to protect healthcare personnel from inhaling infectious particles that are of small diameter, likely to remain infectious over long time or distance, or both.

Airborne Transmission of Diseases: Factors that Affect Risk

Experimental studies as well as epidemiological evidence continue to inform our knowledge on how various diseases are transmitted. Aerosol studies show that infectious particles are released from a patient's respiratory tract in a wide range of sizes, and the size of a droplet or particle quickly decreases as water evaporates from it. Particles up to 100 micrometers in diameter are known to be inhalable into the nose or mouth. Smaller particles stay airborne longer than larger particles, which increases exposure time and the distance the particles might travel. Particles of various sizes can remain suspended in air for hours, especially with high rates of air movement in the room. Small particles can travel on air currents and potentially be carried long distances from the source of generation.

The other factor affecting risk of infection is how long a specific pathogen can remain viable and infectious while suspended in air. We know that certain pathogens, such as *M. tuberculosis*, are able to remain infectious for a long time in the air. It is likely that this feature plays a critical role in determining if a pathogen is transmitted

FIGURE 3: CDC AND HICPAC—DISEASES/PATHOGENS REQUIRING AIRBORNE PRECAUTIONS[1]

- Aerosolizable spore-containing powders such as Anthrax/*Bacillus anthracis*
- Aspergillosis (if massive soft tissue infection with copious drainage and repeated irrigations required)
- Varicella (chickenpox) and herpes zoster (disseminated or in an immunocompromised host)/Varicella-zoster virus
- Measles (rubeola)/Measles virus
- Monkeypox/Monkeypox virus
- Severe acute respiratory syndrome (SARS)/SARS-associated coronavirus (SARS-CoV)
- Smallpox (variola)/Variola virus
- Tuberculosis (TB)/*Mycobacterium tuberculosis*
- Novel or emerging pathogens and any other disease for which public health guidelines recommend airborne infection isolation[2]

[1] Some of these diseases may require additional precautions such as contact precautions.

[2] Hospitals need to look to CDC and public health authorities for the latest guidance. Respiratory protection may be advisable. For examples, see CDC's latest guidance for novel influenza A viruses associated with severe disease and Middle East Respiratory Syndrome Coronavirus.

Photo: Haylard Health, Inc.

Worker wearing a filtering facepiece respirator.

via the airborne route. However, for many other pathogens, there is less information available than for TB on how long they remain viable and infectious while airborne.

Healthcare personnel caring for patients who may be infected with a disease requiring Droplet Precautions may not just be at risk of exposure of their mucosa to sprays of large infectious droplets and possible subsequent disease—they may also be at risk of disease transmission from inhaling particles that are present in the room air and are infectious in the short-term and at closer distances. Disease transmission can only occur if the organism remains viable and infective while it is airborne and enough particles to represent an infectious dose (also not known for many organisms) are inhaled. The extent of this inhalation risk is not known for all diseases currently calling for Droplet Precautions. However, the use of respiratory protection in such instances as a precautionary measure could help to reduce the potential risk from inhalation exposure wherever small particle aerosol transmission may be possible. Nonetheless, in practice, most identified instances of infections transmitted by aerosols from patients to healthcare personnel occur due to lapses in administrative controls (e.g., failure to identify infected patients and implement appropriate precautions).

Respirator program administrators (RPAs) should keep current with the scientific literature about disease transmission and with changing public health recommendations. As an example, in 2010 the CDC issued new infection control guidance for seasonal influenza, a disease for which droplet precautions are recommended, stating that respiratory protection should be used when higher-risk, aerosol-generating procedures (discussed in more detail in the next section) are performed on a patient suspected or confirmed with influenza. In 2014, the CDC issued new guidance for Ebola virus disease recommending respirator use. Hospitals may always choose to adopt respiratory protection policies that are more protective than current public health guidance.

More Considerations About Respirator Use

Respiratory protection for ATDs must be selected based on the pathogen and the anticipated risk associated with specific job tasks to be performed by employees. For the protection of healthcare personnel performing patient care, both the likelihood that the patient may have an ATD and the nature of the procedure to be performed on the patient must be considered.

Identifying Patients with an ATD

In cases where a diagnosis has not yet been made, or the pathogen has not been identified and confirmed, the employer's written respirator policies must provide healthcare personnel with clear direction on how to make decisions about the use of respiratory protection. A critical component of a respiratory protection

FIGURE 4: CDC AND HICPAC—DISEASES/PATHOGENS REQUIRING DROPLET PRECAUTIONS[1, 2]

- Diphtheria, pharyngeal
- Epiglottitis, due to *Haemophilus influenzae* type b
- *Haemophilus influenzae* serotype b (Hib) (see disease-specific recommendations)
- Influenza viruses, seasonal[2]
- 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
- Mycoplasma pneumonia
- Parvovirus B19 infection (erythema infectiosum)
- Pertussis (whooping cough)
- Pharyngitis in infants and young children
- Pneumonia
  - Adenovirus
  - *Haemophilus influenzae,* serotype b, infants and children
  - Meningococcal
  - *Mycoplasma,* primary atypical
  - *Streptococcus,* Group A
- Pneumonic plague/*Yersinia pestis*
- Rhinovirus
- Rubella virus infection (German measles)/Rubella virus
- 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[2]

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[1] Some of these diseases may require additional precautions such as contact precautions.

[2] CDC currently recommends respirator use during aerosol-generating procedures for patients with suspected or confirmed seasonal influenza or viral hemorrhagic fevers. October 2014 CDC guidance for Ebola virus disease recommends at least an N95 respirator. See Figure 9 on page 24.

program is training staff on the hospital's policies regarding which situations should trigger respirator use. The training must be given to all caregivers and support staff, regardless of experience or skill set. Signage on patient rooms and notes in medical charts are additional ways in which respirator use policies and decisions are communicated between staff.

Personnel should be trained, consistent with facility respirator use policies, on how the patient's signs and symptoms and clinical judgment about potential diagnoses relate to risk-based decisions on respirator use. For example, when a patient presents in the emergency room with a cough, fever, fatigue, night sweats, unexplained weight loss, and loss of appetite, healthcare personnel should suspect tuberculosis and appropriately isolate the patient and wear respiratory protection pending definitive diagnosis. Healthcare personnel should also consider the possible diseases and pathogens associated with the diagnostic tests that have been ordered for the patient and the diseases currently circulating in the population when making decisions about respiratory protection. See "Appendix A" on page 41 for a table of symptoms, potential pathogens, and recommended precautions based on Table 2 in CDC and HICPAC's *2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings*.

A prudent approach is to implement the use of respirators early on based on suspected diagnosis, for example in the emergency department, and discontinue it later if the patient is subsequently diagnosed with a disease that does not require respiratory protection. Other locations including operating rooms, intensive care units, and pulmonary units, may also require more frequent use of respirators and/or use of a higher level of respiratory protection due to the number of aerosol-generating procedures performed (discussed below).

Performing Higher-Risk, Aerosol-Generating Procedures

Aerosol-generating or cough-inducing procedures are procedures that can generate much higher concentrations of airborne particles and ATD pathogens as compared to coughing, sneezing, or speaking. The likelihood of exposure via contact with mucosal membranes and inhalation of aerosols is elevated when aerosol-generating procedures are performed and the airborne concentration of pathogens increases. See Figure 5 to the right for some examples of aerosol-generating procedures. Each hospital should review all procedures to determine which have a higher capacity for emitting infectious particles into the room air.

CDC and HICPAC recommend the use of respiratory protection when aerosol-generating procedures are performed on patients suspected or known to be infected with an illness or pathogen requiring Airborne Precautions. CDC also recommends respirators for aerosol-generating procedures on patients suspected or confirmed as having seasonal influenza, viral hemorrhagic fever, MERS-CoV, and novel influenza A viruses associated with severe disease. CDC and HICPAC consider *Neisseria meningitidis* a pathogen requiring Droplet Precautions, but acknowledge that aerosol-generating procedures have been associated with disease transmission. In the absence of definitive evidence, prudent practice suggests respirator use may be advisable when aerosol-generating procedures are performed on patients suspected or known to have diseases requiring Droplet Precautions.

FIGURE 5: EXAMPLES OF AEROSOL-GENERATING PROCEDURES INCLUDE, BUT ARE NOT LIMITED TO:

- Endotracheal intubation
- Open respiratory and airway suctioning
- Tracheostomy care
- Cardiopulmonary resuscitation
- Sputum induction
- Bronchoscopy
- Aerosolized administration of pentamidine or other medications
- Pulmonary function testing
- Autopsy, clinical, surgical, and laboratory procedures that may aerosolize pathogens, such as operating bone saws, centrifuges, blenders, and aspiration equipment.

Novel or Other Pathogens Requiring Enhanced Protection

As demonstrated by the emergence of SARS and avian influenza, there will be uncertainty around the routes of exposure with novel pathogens, as well as lack of immunity in the population and unknown severity of disease outcome. Public health authorities may recommend the use of respiratory protection by healthcare personnel and airborne infection isolation, at least until airborne transmission can

be ruled out. Federal OSHA recommends that employers consider that the use of respiratory protection may be necessary when they are preparing for pandemic influenza. Specific recommendations about the need for Droplet or Airborne Precautions will be made at the time of an actual pandemic and based on such factors as transmissibility and severity of disease.

CDC and HICPAC recognize that certain infectious agents may be considered epidemiologically important and require enhanced protection, including the use of respiratory protection. Pathogens may be considered epidemiologically important if they have a propensity for transmission within healthcare facilities, are resistant to first-line therapies, or have high rates of morbidity and mortality. Pathogens may also be considered epidemiologically important if they are newly discovered, emerging, or re-emerging, and little or no information about their transmission, resistance, or disease rates is available. These pathogens may not be regularly encountered, but facilities and healthcare personnel must be prepared to consider and include these pathogens on differential diagnoses when appropriate, and implement infection control measures, including respiratory protection, when necessary.

Photo: Bullard Safety

Healthcare personnel wearing a powered air-purifying respirator while treating a patient.

The OSHA Respiratory Protection Standard

Hospitals and all other employers who require employees to use respiratory protection for control of exposures to airborne contaminants, including ATD pathogens, must comply with Federal OSHA's Respiratory Protection standard, 29 CFR 1910.134, or the equivalent state standard. The OSHA Respiratory Protection standard establishes legally enforceable requirements about how respirators are to be used.

When respirator use is required, the Respiratory Protection standard requires that all employee use of respirators be done within the context of a comprehensive and effective respiratory protection program. The program must be in writing, have a designated respirator program administrator, and specify the employer's 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 the policies and procedures used to meet these requirements up to individual employers. See Figure 6 on page 14 for a summary of the key requirements of the standard (as it pertains to the use of air-purifying respirators) and the section of this document titled "Developing a Respiratory Protection Program" on page 19 for more information.

The Respiratory Protection standard does not specify the circumstances under which healthcare personnel must use respirators for protection against ATD pathogens. However, OSHA requires employers to evaluate the respiratory hazards in the workplace, and expects that hospitals develop their respiratory protection policies based on CDC/HICPAC and other public health guidance from CDC, state, and local health departments. In

the event of an OSHA compliance investigation, an employer's failure to implement respirator use according to recognized and generally accepted good infection control practices and public health guidance could result in an OSHA citation.

The National Personal Protective Technology Laboratory (NPPTL) within the CDC's National Institute for Occupational Safety and Health (NIOSH) tests respirators, reviews test data submitted by respirator manufacturers, and approves respiratory protection equipment when requested by respirator manufacturers. OSHA only permits use of NIOSH-approved respirators. NIOSH also conducts scientific research and develops guidance related to respiratory protection and other PPE. NIOSH research findings and recommendations may be considered by OSHA when setting or enforcing health and safety standards.

Twenty-seven states and territories operate Federal OSHA-approved State Occupational Safety and Health plans. State standards must be at least as effective as the corresponding Federal OSHA standards. California's state OSHA program (Cal/OSHA) has promulgated the only specific, comprehensive aerosol transmissible diseases standard in the United States; any employer with workplaces in California must comply with these requirements which address respiratory protection and other areas of infection control.

The OSHA website provides a list of State Plans with links to their websites and additional information on each plan.

FIGURE 6: SOME KEY REQUIREMENTS OF THE 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 (including filtering facepiece respirators)
- Procedures for proper use, storage, maintenance, repair, and disposal of respirators
- Training
- Program evaluation including consultation with employees
- Recordkeeping

Types of Respiratory Protection

Respirators are devices worn over the nose and mouth to protect the wearer from hazardous materials in the breathing zone.

Respirators are available in many types (described in detail below), models, and sizes from several manufacturers for a variety of applications. The most common types of respirators in healthcare are filtering facepiece respirators and powered air-purifying respirators (PAPRs). Different types of respirators are designed to provide different levels of protection and to protect against different hazards. Professional judgment along with the type of airborne contaminant, its concentration, its potential to cause a health effect in exposed personnel, and any applicable regulation dictate the type of respirator that must be worn. When information regarding the exposure is limited, the decision will rely more heavily on professional judgment and more protective respirators may be selected for use. Each facility's written policies and training programs should specify whom to contact for questions or additional information.

OSHA has given each class of respirator an assigned protection factor (APF) to indicate the minimum level of protection that can be expected when the respirators are properly selected and used in a continuing, effective respiratory protection program. For higher-risk exposure situations (i.e., higher concentration of infectious particles), choosing a respirator with a higher APF provides a higher level of protection for the wearer. The APFs for different types of respirators are presented in Table 1 of the OSHA Respiratory Protection standard and in Appendix B of this document.

All respirators used in the workplace must be tested by the manufacturer and tested and certified by NIOSH. The two major types of respirators, air-purifying respirators and air-supplying respirators, are described below.

Air-Purifying Respirators

Air-purifying respirators (APRs) work by removing gases, vapors, aerosols (droplets and solid particles), or a combination of contaminants from the air through the use of filters, cartridges, or canisters. APRs with filters will remove particles and droplets (also called aerosols) from the inhaled air, while those with chemical cartridges or canisters are designed to remove gases and vapors. To help employers select the right protection for a specific contaminant, all filters, cartridges, and canisters must carry a label

Photo: MSA Safety, Inc.

Worker wearing a half mask elastomeric air-purifying respirator.

approved by NIOSH. As a secondary means of identification, cartridges and canisters must also be color-coded as specified by NIOSH. Air-purifying respirators do not provide clean breathing air from a source independent of the work area; therefore, APRs cannot be worn in an oxygen-deficient atmosphere.

Filters come in various degrees of filtration efficiency (see Figure 7 on page 17 for more information on the NIOSH filter classes); however, leakage around the facepiece of a respirator plays a larger role than filter efficiency in determining the protection provided. When APRs are required to provide protection from ATD pathogens, they must be fitted with particulate filters at least as efficient as an N95 filter, not cartridges or canisters for gases and vapors.

Types of Air-Purifying Respirators

Non-powered, or negative-pressure, respirators have a tight-fitting facepiece, which can be either a half mask that covers the nose and mouth or a full facepiece that covers the nose, mouth, and eyes. They may be disposable (or "single-use," meaning the filter is not replaceable and the respirator cannot be cleaned) filtering facepiece respirators where the entire facepiece is made of filtering material, or elastomeric respirators that have replaceable filters or cartridges.

"N95 respirator" is a term used in healthcare to refer to a half mask APR with a NIOSH-approved N95 particulate filter. An N95 respirator may be a filtering facepiece respirator or half mask elastomeric respirator; both have an APF of 10 and may be used in healthcare. These respirators are described as "negative-pressure" because the pressure inside the facepiece is negative during inhalation compared to the pressure outside the respirator. Filtering facepiece respirators are also available with other classes of filters and spray- or splash-resistant facemask material on the outside to protect the wearer from splashes (sometimes referred to as "surgical N95 respirators").

Powered air-purifying respirators (PAPRs) may be used in healthcare when aerosol-generating procedures are performed, by hospital first receivers, or when the respirator user is not able to wear a tight-fitting respirator. PAPRs have a battery-powered blower that forces air in the room through filters (for particles) or cartridges (for gases or vapors) to clean it before delivering it to the breathing zone of the wearer. High-efficiency (HE) filters are the only

Photo: Moldex

Worker wearing a filtering facepiece air-purifying respirator.

class of particulate filters available for powered air-purifying respirators. PAPRs are generally more protective than non-powered half mask respirators because the blower creates positive pressure inside the facepiece, reducing inward leakage of potentially contaminated air.

A PAPR may have a tight-fitting half or full facepiece or a loose-fitting facepiece, hood, or helmet. A PAPR has an OSHA APF of at least 25, compared to an APF of 10 for a filtering facepiece respirator or elastomeric half mask respirator; this means the PAPR reduces the aerosol concentration inhaled by the wearer to 1/25th of that in the room air, compared to a 1/10th reduction for half mask APRs. OSHA allows employers to use an APF of 1,000 for PAPRs with hoods when they have evidence from the manufacturer demonstrating performance at this level. OSHA does not require fit testing of loose-fitting PAPRs.

Air-Supplying Respirators

Air-supplying respirators (also known as atmosphere-supplying respirators) include supplied-air respirators and self-contained breathing apparatus (SCBAs). Air-supplying respirators work by providing clean breathing air from a source independent of the work area. Supplied-air respirators typically have higher APFs than APRs; the APF can be up to 1,000. These respirators obtain breathing air from a compressor or a large pressurized cylinder that is not carried by the user. SCBAs can have APFs of up to 10,000. They are usually equipped with a full facepiece and contain their own breathing air supply in a pressurized cylinder that is carried by the user.

FIGURE 7: NIOSH FILTER CLASSES

Filter 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. Resistant to oil.
P95	Filters at least 95% of airborne particles. Oil proof (strongly resistant to oil).
P99	Filters at least 99% of airborne particles. Oil proof (strongly resistant to oil).
P100	Filters at least 99.97% of airborne particles. Oil proof (strongly resistant to oil).
HE (high-efficiency)	Filters at least 99.97% of airborne particles. For use on PAPRs only.

Air-supplying respirators may have a tight-fitting facepiece, which can be a half mask or a full facepiece, or a loose-fitting facepiece, hood, or helmet. They do not require filters or cartridges and will protect the wearer from all types of contaminants (particles, gases, and vapors) and, in certain cases, oxygen-deficient atmospheres. These respirators are less likely to be used in a hospital setting except, perhaps, by emergency responders or construction contractors.

See the "References, Resources, and Tools" section on page 36 for additional sources of information on respiratory protection.

Photo: MSA Safety, Inc.

Worker wearing a self-contained breathing apparatus respirator.

Developing a Respiratory Protection Program

Assigning Responsibility

A key component of a successful respiratory protection program (RPP) is the assignment of responsibilities for the implementation and administration of the program. OSHA requires that "the program be administered by a suitably trained program administrator." Although the respirator program administrator (RPA) does not have to be a health and safety professional, he or she must have knowledge of the principles of respiratory protection and the authority to implement the program. While the RPA must oversee the program, he or she can assign others to help manage and implement medical evaluations, training, fit testing, and other aspects of the program. See the "References, Resources, and Tools" section (pages 36-40) for training resources for RPAs.

Hospitals must decide how best to manage RPPs that cover personnel who must use respirators to reduce their exposure to specific chemicals only, ATD pathogens only, or both chemicals and ATD pathogens. These employee groups may work in very different departments with different supervisors and/or have different types of jobs. A single RPP with one program administrator is preferred to ensure consistency and accountability. However, if two separate RPPs and program administrators exist to cover respirator responsibilities for chemical versus infectious exposures, the employer must ensure that overall policies are coordinated, adequate technical expertise is available for each program, and that all aspects of both programs are effectively implemented.

Performing a Hazard Evaluation

The purpose of the hazard evaluation is to identify and evaluate potential exposures in the workplace that might require the use of respiratory protection. Once identified, these exposures must be assessed to determine how often they are expected to occur and the level of exposure, so that they can be controlled to the extent feasible and, if required, appropriate respiratory protection can be selected.

A hazard evaluation must be completed for all respiratory hazards, including chemical exposures and exposure to infectious agents. In the case of infectious agents, it is not generally feasible to quantify the level of exposure, nor is it known what level of exposure will cause infection in a specific individual. Therefore, respirators for infectious agents must be selected according to anticipated exposure by task and according to recognized and generally accepted good infection control practices and public health guidance such as that provided by CDC's HICPAC, Federal and state OSHA, and state health departments. These organizations should be consulted for guidance in assessing the hazards associated with novel or emerging infectious diseases.

When conducting a hazard evaluation in the patient care setting, it is useful to systematically consider all of the activities in your units.

First, think about who will be in contact with patients who may have ATDs, such as tuberculosis or influenza. ATDs are divided by CDC's HICPAC into two categories: (1) diseases requiring Airborne Precautions; and (2) diseases requiring Droplet Precautions. See Figure 3 and Figure 4 on pages 9 and 11 for complete lists of these diseases. You should also review local, state, and federal public health guidance to identify whether there are any additional diseases that should be considered (e.g., a novel pathogen currently circulating in the community).

The following questions should help to guide your thinking about who in your facility may be reasonably anticipated to be exposed to patients or other sources of ATD pathogens.

- Who is exposed to suspected or confirmed cases of ATDs?
- Who will greet and triage patients?
- Who will provide care for ATD patients?
- Who will be performing aerosol-generating procedures on patients with ATDs, on cadavers, or in laboratories? See Figure 5 on page 12 for examples of aerosol-generating procedures.
- Who will be cleaning the ATD patient rooms?
- Do you have contractors (e.g., those who service ventilation systems), or temporary workers in your facility who are reasonably anticipated to be exposed to patients or equipment that may be a source of ATD pathogens?
- Who will be designated as a first receiver of victims exposed to unknown radiological, biological, or chemical agents?
- Do you have physicians, students, volunteers, or others who are not hospital employees and are reasonably anticipated to be exposed to ATD pathogens? See Figure 8 on page 21.

Based on an assessment of the potential exposure hazards, you will then make a determination regarding the minimum level of respiratory protection required for these exposures. Consider the PPE (including type of respirator) and other controls that you will require for each combination of task (aerosol-generating procedures, direct patient care, providing services in patient rooms, etc.) and disease or hazard. This topic will be discussed further in the section on "Respirator Selection."

Finally, think about other hospital employees who may have exposure to respiratory hazards other than ATD pathogens that cannot be feasibly reduced by engineering, administrative, or work practice controls. For chemical exposures, airborne concentrations should be measured in order to determine the level of respiratory protection that will be needed to reduce the exposure to acceptable levels.

- Are there housekeeping or maintenance personnel who are exposed to chemicals used in cleaning, repairs, or facility maintenance?
- Is anyone in central supply exposed to hazardous chemicals used in disinfection or sterilization?
- Are there research or clinical laboratories with staff who will need respiratory protection?
- Is anyone exposed to anesthetic waste gases or hazardous drugs?

If you do not have the expertise in-house to complete a hazard assessment, an industrial hygienist can be consulted. The American

Industrial Hygiene Association (AIHA) provides a list of consultants. You may also ask for help from your workers' compensation insurance carrier or, if your business is small or medium-sized, from the OSHA On-site Consultation Program.

Developing Policies and Procedures

Once you have determined who will administer the program and which employees will be included, you are ready to develop the policies and procedures that will make up your written RPP. The RPP must have a section that addresses each of the elements described below. A template for a written RPP appears in Appendix D of this document. It was specifically designed for hospitals, and you may find that customizing it is the easiest way to develop your written program. If you choose to do this, it is best to use this toolkit and the template together. The following sections go through the process of developing each of the required elements of your written program.

Respirator Selection

In this section of your written RPP, you should 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. You may want to put all of this information into a table or spreadsheet either in the body of your written program, or as an appendix. The guidelines from CDC/HICPAC and other public health guidance include recommendations for minimum respiratory protection for certain tasks and infectious agents. However, employers are always responsible for assessing the respiratory hazards, controlling identified hazards, and providing a workplace free from hazards likely to cause serious harm. The employer can always choose to select a higher level of respiratory protection than the minimum required.

FIGURE 8: ESTABLISH POLICIES REGARDING NON-EMPLOYEES

You must consider what your respirator policy will be regarding non-employees. Although they may not be employed by the hospital, your facility shares some responsibility for ensuring the protection of physicians with privileges to practice in the facility, students, contractors, and volunteers. All people working and volunteering in the hospital should be required to follow your policies on respirator use for protection from infectious agents as well as chemicals such as asbestos, formaldehyde, and ethylene oxide. A clear statement indicating who is responsible for implementing all elements of the respirator program for these people should be part of your written policy. In many cases, including non-employee doctors, contractors, and volunteers in the hospital's respiratory protection program will be the best way to ensure consistent and effective protection.

See the following web sites for OSHA policies and procedures for multi-employer work sites.

- OSHA's Multi-Employer Citation Policy (CPL-2-0.124)
- Interpretation of the Bloodborne Pathogens standard at a multi-employer worksite

Based on current recognized and generally accepted infection control practices, employees who perform any of the following activities that involve a patient suspected or confirmed with a disease requiring Airborne Precautions should wear respiratory protection at least as protective as an N95 respirator when:

- Entering an airborne infection isolation (AII) room or area in use for AII;
- Present during the performance of procedures or services;
- Repairing, replacing, or maintaining air systems or equipment that might contain or generate aerosolized pathogens;
- The patient has left the area and the room air has not yet been adequately ventilated to clear contaminants;
- Performing decontamination procedures;
- Working in a residence where the patient is located;
- Transporting the patient within the facility when the patient is not masked; or
- Transporting the patient in an enclosed vehicle (e.g., van, car, ambulance, or helicopter).

Properly fitted filtering facepiece respirators (or equivalent) are expected to reduce exposures to one-tenth of the concentration that is in the air, based on OSHA's APF of 10.

Any employee performing an aerosol-generating procedure on a patient suspected or confirmed with a disease requiring Airborne Precautions, or who is in the area where the procedure is being performed, can be exposed to much higher levels of infectious aerosols. These employees should wear a respirator with an APF of 10 and should consider wearing a respirator with a higher APF, such as a PAPR with a HEPA filter, unless the procedure is performed with the patient in a ventilated enclosure. A PAPR with a loose-fitting facepiece and a HEPA filter is expected to reduce exposure to airborne contaminants to 1/25th of the concentration in the room.

The CDC recommends that personnel performing an aerosol-generating procedure on a patient suspected or confirmed with seasonal influenza wear at least an N95 respirator, even though influenza has previously been considered a disease requiring only Droplet Precautions (ordinarily calling for a surgical mask). The latest guidance from CDC recommends the use of respirators for all patient-care activities on patients who may be infected with a novel influenza A virus associated with severe disease.

In the case of an influenza pandemic, OSHA (as well as CDC and other public health agencies) will make specific recommendations on a case-by-case basis after considering information available at that time. OSHA recommends that employers be prepared to use a NIOSH-approved N95 respirator for routine care. In some instances a more protective respirator may be necessary.

The Respiratory Protection Selection Guide for Aerosol Transmissible Diseases included as Figure 9 on page 24 will be useful in making appropriate respirator selections for specific diseases and tasks, and for training your staff on respirator use. The selection guide is based on recommendations from the 2007 CDC/HICPAC Guidelines, CDC, and OSHA.

Selecting Respiratory Protection in the Laboratory or Autopsy Setting

Assessment of exposure risk and selection of respirators and other control measures for hospital laboratory and autopsy workers exposed to ATD pathogens must be based on consideration of different factors than those for

workers providing patient care. In the lab, the primary factors include the pathogen that is likely to be present in the material being handled (which may be unknown), and whether the procedures to be performed by the employee are likely to generate aerosols.

Laboratory worker protection policies should be described in a written biosafety plan, developed by the lab biological safety officer and other personnel with knowledge of laboratory procedures as well as worker protection expertise. The primary resource for lab biosafety, including risk assessment, recommended practices, selection of controls, and containment levels, is the CDC's Biosafety in Microbiological and Biomedical Laboratories (BMBL).

Your written RPP should cover laboratory workers and specify the level of respiratory protection required for different pathogens or job tasks, in accord with the biosafety plan and other written lab operating procedures.

Photo: Centers for Disease Control and Prevention

Laboratory worker wearing powered air-purifying respirator.

Stay Informed as Public Health Guidance is Updated

Keep in mind that respiratory protection requirements to protect against infectious diseases are based on guidance or requirements from OSHA, CDC/NIOSH, and state or other public health agencies. It is important to stay informed about any changes in public health guidance and regulations 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 to conform to new regulations and guidance.

The CDC now recommends the use of respiratory protection with at least an APF of 10, such as a filtering facepiece respirator, in addition to airborne infection isolation where feasible, when aerosol-generating procedures are performed on patients with suspected or confirmed influenza. This recommendation raises the issue of whether respirator use during aerosol-generating procedures should also be considered for other infectious diseases (e.g., pertussis, meningococcal disease) that currently call for Droplet Precautions. For example, at least one study has demonstrated airborne transmission of pertussis. An even more protective approach would be to require respiratory protection for all procedures performed on patients with diseases requiring Droplet Precautions, because spontaneous coughs and sneezes can also generate infectious aerosols.

Existing guidance may continue to change with advances in infectious disease research, in the design of respiratory protection to address concerns about issues such as comfort and ease of communication, and/or as hospitals gain more experience with their respirator programs.

FIGURE 9: RESPIRATORY PROTECTION SELECTION GUIDE FOR AEROSOL TRANSMISSIBLE DISEASES

The employer is responsible for selecting PPE, including but not limited to respiratory protection, appropriate for the hazard and the environment. The employer can always choose to select a higher level of respiratory protection than the minimum required.

Disease (suspected or confirmed)	Job Task	Respiratory Protection
Diseases requiring Airborne Precautions[1]	Routine patient care and support operations	At least an N95 respirator
	Aerosol-generating procedures[2]	At least an N95 respirator[3]
Seasonal influenza and viral hemorrhagic fever (VHF)	Routine patient care and support operations	At a minimum use a surgical mask[4, 5] An N95 respirator may reduce aerosol exposure
	Aerosol-generating procedures[2]	At least an N95 respirator[5, 6, 7]
Other diseases requiring Droplet Precautions[8]	Routine patient care and support operations, including aerosol-generating procedures[2]	At a minimum use a surgical mask[4] An N95 respirator may reduce aerosol exposure
Novel pathogens/pandemic influenza		Follow current public health guidance

[1] See list on page 9.
[2] See definition on page 12.
[3] Cal/OSHA requires at least a PAPR.
[4] A surgical mask is not a respirator but can be effective in blocking large particles.
[5] October 2014 CDC guidance for Ebola virus disease recommends at least an N95 respirator.
[6] CDC's Prevention Strategies for Seasonal Influenza in Healthcare Settings.
[7] See page 119 of CDC and HICPAC's 2007 Guideline for Isolation Precautions for precautions for VHF.
[8] See list on page 11.

PAPRs Used by First Receivers

You may also have employees who have been designated first receivers for emergency response purposes. These employees are expected to decontaminate or provide initial care for victims of a biological or chemical emergency. When their exposures may be to unknown substances, hospital first receivers are required to have special training and use the most protective type of PAPR approved by NIOSH for chemical, biological, radiological, and nuclear (CBRN) exposures. These PAPRs have a full facepiece, or a hood or helmet, and a combination HE filter and chemical cartridge. They must be a type that has an APF of 1,000, meaning that it will reduce the exposure of the wearer to 1/1000th of the airborne contaminant concentration. Refer to OSHA Best Practices for Hospital-Based First Receivers of Victims from Mass Casualty Incidents Involving the Release of Hazardous Substances for more information on PPE for first receivers.

Photo: Hospital Corporation of America

Workers wearing powered air-purifying respirators while treating a patient.

Use of Respirators and Maintaining a Sterile Field

Yet another consideration is which respirators to use for aerosol-generating or other procedures conducted in operating rooms or other settings that involve maintaining a "sterile field" free of microorganisms. There is some concern that exhaled air from wearers of PAPRs or APRs with exhalation valves can flow into and potentially contaminate the sterile field.

Local exhaust ventilation and adequate dilution ventilation should be used where possible at the source of aerosol generation to reduce the need for respiratory protection. Surgical respirators (without exhalation valves) should be selected for use in environments where a sterile field must be maintained. Currently, there is insufficient evidence to support the safe use of PAPRs in these environments.

Respirators for Chemical Gas or Vapor Hazards

In a hospital setting, respiratory hazards may include gases and vapors. 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) or cleaning and maintenance activities. It is important to note that N95 filtering facepiece respirators, PAPRs, or other types of APRs, when used with only particulate or HE filters, will not protect the wearer from gas or vapor exposures. Filters are designed to remove particles from the air, but will not remove gases or vapors (e.g., glutaraldehyde, formaldehyde, or ethylene oxide) from the air.

If you need help selecting respirators for exposures to hazards other than infectious agents, the following resources will be helpful in making

your selection. The NIOSH Respirator Trusted-Source Information Page provides information on the selection and use of respirators, and both the NIOSH Respirator Selection Logic and Federal OSHA Respirator e-Tool (which contains OSHA's updated APFs) aid in the selection of respirators and the development of a change schedule for cartridges. See Figure 10 to the right for a summary of respirator selection considerations for ATD pathogens.

Respirator Use

In this section of your written RPP, describe your facility's policies regarding the use of respirators. Include detailed procedures for the routine use of respirators. For example, describe proper procedures for inspecting and putting on (donning) the respirators used at the hospital, and train users to always perform a user seal check whenever they put on a tight-fitting respirator. Describe and demonstrate proper respirator-specific procedures for taking the respirator off (doffing) and explain the importance of the sequence of removal of the respirator with other PPE so as to avoid self-contamination (see the CDC slide show and the figures on pages 134-135 of CDC and HICPAC's 2007 Guideline for Isolation Precautions). Employees should also be trained to recognize when the respirator is not working correctly (e.g., if employee is experiencing symptoms from exposure to chemicals, or having difficulty breathing).

In order to clearly state your policies for respirator use, it might be helpful to answer the following question. What will your policy be for employees with facial hair or other conditions that prevent a good seal to the face? Employees who use tight-fitting respirators are not permitted to have facial hair that interferes with the facepiece seal or valve function. Hospitals may provide loose-fitting PAPRs to employees who have facial hair,

FIGURE 10: SUMMARY OF RESPIRATOR SELECTION CONSIDERATIONS FOR AEROSOL TRANSMISSIBLE DISEASE PATHOGENS

- Determine who has potential occupational exposure to ATD pathogens, the level of exposure they are likely to encounter, and how frequently they may be exposed for each task they perform. Be sure to consider the hierarchy of controls before resorting to the use of respiratory protection.
- Use federal, state, and local public health and occupational health and safety guidelines and regulations for choosing the appropriate level of protection for each task that results in exposures that cannot be prevented through other types of controls (e.g., engineering controls such as ventilation).
- Make sure the respirators you have selected are NIOSH-approved and provide the appropriate level of protection from all types of contaminants (particles and gases or vapors) as needed. Consult an industrial hygienist if you have questions about the level of protection provided. For example, make sure the PAPRs used by first receivers have an assigned protection factor of 1,000. Consult your supplier if you have questions about the level of protection provided.
- Stay aware of the potential for counterfeit respirators, particularly during pandemic outbreaks. Refer to NIOSH's Trusted Source Page and the OSHA/NIOSH video on counterfeit respirators for more information.
- Make sure that the chosen respirator is not putting the patient at risk and that use is consistent with other infection prevention policies.
- Stay aware of changes in respirator selection guidance.

or for whom other respirators available at the facility do not provide an acceptable fit. This is acceptable as long as employees consistently use the loose-fitting PAPR when required, have been trained in its use, and the PAPR provides adequate protection for the specific hazard (i.e., is equipped with the correct type of filter or cartridge).

List the reasons for which an employee might leave a contaminated area to adjust or replace his or her respirator. These should include problems with the use of the respirator such as difficulty breathing, loss of face seal, gross contamination or saturation of the filter material, etc. This list should include a policy that wearers of respirators with chemical cartridges must leave the contaminated area to replace the cartridges or respirator when they detect breakthrough of the contaminant or because the usable service life has been reached, as indicated in the change-out schedule provided by the program administrator.

Storage, Maintenance, Repair, and Disposal

This section should include, for each type of respirator, detailed and specific procedures for storage, maintenance, repair, and disposal. These procedures should include a description of where respirators are stored in each unit or department, how they should be stored between uses by a respirator user (if allowed), how they will be maintained and who is responsible for maintenance, and who is responsible for ensuring an adequate supply.

Most hospitals keep carts of N95 filtering facepiece respirators in each unit or outside the isolation rooms, while PAPRs are often kept in central supply and are ordered when needed for aerosol-generating procedures. Some hospitals have decided that since most aerosol-generating procedures will be done by the respiratory therapy department, the PAPRs will be stored there. Some hospitals issue PAPR hoods to individuals who are responsible for maintaining them, while central supply or materials management is responsible for decontaminating PAPR motors and blower units and charging batteries. Whatever you decide works best for your facility should be described here.

Photo: Haylard Health, Inc.

Healthcare personnel in a stockroom.

Filtering facepiece respirators are designed to be worn by one individual (i.e., not shared) and disposed of after use. Users should discard respirators when they become unsuitable for further use due to excessive breathing resistance (e.g., particulates clogging the filter), unacceptable contamination/soiling, or physical damage. Filtering facepiece respirators should be removed with minimal handling and disposed of properly. Hand hygiene should always be performed after removing a respirator.

From the standpoint of the wearer's protection, filtering facepiece respirators may be taken off and put on again as long as they are not damaged or soiled, or contaminated inside the facepiece. However, a respirator used in the care of an infectious patient should be considered

potentially contaminated with infectious material on the outside and a source of contact transmission for healthcare personnel or patients. Therefore, the risk of contaminating the inside of the respirator through improper handling and the risk of infecting the patient must be weighed when making decisions about redonning filtering facepiece respirators. Tuberculosis is not transmitted via contact and, therefore, reuse by the same wearer is acceptable as long as the filtering facepiece respirator is not damaged or soiled.

Describe your facility's policies regarding use and disposal of filtering facepiece respirators in the written RPP, including policies, procedures, and training to reduce the potential for contact transmission. If different policies on reuse may be implemented in the event of a respirator shortage, the RPP should address those policies (or be updated to document changes in policies).

You should also describe procedures to follow when users discover problems with respirators.

- To whom do they report the problem?
- Who does the repairs?
- Who decides when to discard a reusable respirator and replace it rather than trying to repair it?
- What are the procedures for disposal of used or damaged filtering facepiece respirators?

NIOSH has issued guidance on extended use and limited reuse of N95 filtering facepiece respirators in healthcare settings.

Medical Evaluations

The OSHA Respiratory Protection standard (29 CFR 1910.134) requires that employees be medically evaluated and cleared for respirator use prior to wearing a respirator or being fit tested. The use of some types of respirators can cause an increased resistance to breathing or a build-up of carbon dioxide inside the facepiece. This can lead to medical complications in some individuals for whom it may not be safe to wear a respirator. It may also be unsafe for someone with moderate to severe claustrophobia to wear a respirator. Medical evaluations must be provided by the employer during work time and at no cost to the employee.

Photo: Haylard Health, Inc.

Worker donning a filtering facepiece respirator.

The standard does not require medical reevaluation on a specific schedule. The employer must provide reevaluation when recommended by the physician or other licensed healthcare professional (PLHCP) providing the evaluation, when an employee reports a change in signs or symptoms (e.g., asthma, difficulty breathing) that may affect the ability to use a respirator, or when the supervisor or the RPA becomes aware of a change in employee health status or in physical job demands that may impact respirator use. Many hospitals, however, elect to provide medical clearance on an annual basis.

Employers must provide the healthcare professional evaluating the employee with a description of the type and weight of respirator to be used, the duration and frequency of use,

the expected physical work effort, additional protective clothing and equipment to be worn, and temperature and humidity extremes that may be encountered. This information is critical to the healthcare professional's determination regarding the employee's ability to use a respirator.

Part A of Appendix C of the OSHA Respiratory Protection standard is a questionnaire that solicits information that must be reviewed by a physician or other licensed healthcare professional 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 (see organizations listed in the "References, Resources, and Tools" section of this document starting at page 36). These clinics provide medical clearance for respirator use and may also provide fit testing services.

Make sure that you are clear about 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 must be maintained as confidential medical records and may not be accessible to the employee's supervisor (see "Recordkeeping" on page 33).

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

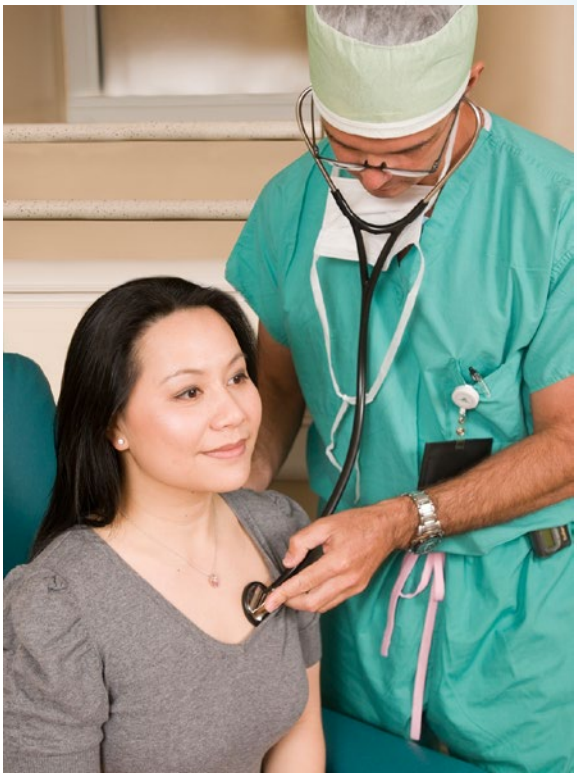

Photo: CDC / Amanda Mills

Physician evaluating a worker for respirator clearance.

users is provided in ANSI/AIHA Z88.6-2006, a voluntary consensus standard. (See "American National Standards Institute (ANSI)" on page 38.) 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 (assuming 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 make available a sufficient number of models and sizes of respirators so that employees can be provided 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 for which they have been successfully fit tested.

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 the employee's physical condition, such as weight gain or loss, facial scarring, or dental changes, that could alter 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.

Photo: Haylard Health, Inc.

Worker receiving qualitative fit testing.

Photo: TSI

Worker receiving quantitative fit testing.

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 APRs, including filtering facepiece respirators, for particulate exposure. The APF for qualitative fit tests is limited to 10, even for respirators 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.

Quantitative Tests: There are three approved quantitative fit tests and all require an investment in relatively expensive equipment. 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 and outside the facepiece.

It is critical that the person conducting the fit testing follows one of the protocols 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

FIGURE 11: SUMMARY OF FIT TEST REQUIREMENTS

- All employees required to wear tight-fitting respirators must be fit tested after receiving medical clearance, prior to respirator use, and annually thereafter.
- 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, or a quantitative test using a condensation nuclei counter or another appropriate instrument.
- Fit testing must be performed by an individual knowledgeable in respiratory protection, and qualified to follow the protocol and train the employee to properly put on and take off the respirator.
- 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.
- 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).

follow the protocol and are skilled at training people on how to put on and take off a 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 healthcare personnel 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 on or before the anniversary date of his or her previous fit test. 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.

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.

A summary of fit test requirements appears in Figure 11 on page 31.

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 healthcare 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;
- 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;
- The general requirements of the OSHA Respiratory Protection standard;
- How to identify and react to respirator malfunctions; and
- How to use the respirator in emergencies (e.g., chemical release) if appropriate.

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 put on and take off 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 he or she has passed a fit test within the last 12 months.

The Respiratory Protection standard requires that the following information 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.

Links to a sample fit test record form and a fit test verification card are provided as resources. Software to track RPP participants and provide reminders of requirement (e.g., medical clearance, fit testing, and training) due dates can be developed in-house or purchased.

Program Evaluation

Regular program evaluation is required by the standard and it is 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 respirators being put on and taken off, 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 he or she is 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 the 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 retraining 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.

Photo: iStockphoto

Healthcare personnel evaluating their RPP.

An evaluation checklist, with instructions on how to use it, is provided in Appendix C of this document. It will make the process of evaluation a bit easier as well as more standardized and comprehensive. You are not required to use a checklist, but it is one way to make sure that you do the evaluations and track any improvements you make.

Summary

Healthcare personnel are at increased risk for exposure to ATD pathogens and, when other controls have been considered and implemented as appropriate, may be required to use respiratory protection.

In order for respirators to provide effective protection they must be properly selected, used, and maintained as part of a written program, which describes how employers will provide employees adequate medical evaluations, training, and fit testing. The program must be evaluated regularly through observation and obtaining input from all respirator users and persons involved in implementing the program. Public health guidance and regulations must be regularly reviewed for changes and utilized to identify tasks and pathogens requiring the use of respiratory protection.

Photo: Fotolia and Microsoft

References, Resources, and Tools

Regulatory Standards and Interpretations

Occupational Safety and Health Administration (OSHA)

Respiratory Protection Standard (29 CFR 1910.134)

Interpretations of the OSHA Respiratory Protection Standard, Appendix A—Fit Testing Procedures and Appendix C—Medical Evaluation

OSHA's Multi-Employer Citation Policy (CPL 2-0.124)

Interpretation of the Bloodborne Pathogens Standard at a Multi-Employer Worksite

State Occupational Safety and Health Plans

California Division of Occupational Safety and Health (Cal/OSHA)

Cal/OSHA Aerosol Transmissible Diseases (ATD) Standard (Title 8 CCR; Section 5199)

Healthcare Resources and Guidelines

Occupational Safety and Health Administration (OSHA)

Safety and Health Topics: Healthcare—Infectious Diseases

Safety and Health Topics: Ebola

Pandemic Influenza Preparedness and Response Guidance for Healthcare Workers and Healthcare Employers, 2007

Guidance on Preparing Workplaces for an Influenza Pandemic, 2009 (PDF)

Precautions for Healthcare Workers during Flu Season

Safety and Health Management Systems and Joint Commission Standards (PDF)

Hospital eTool

Centers for Disease Control and Prevention (CDC)

Healthcare Infection Control Practices Advisory Committee (HICPAC)—2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings

Biosafety in Microbiological and Biomedical Laboratories (BMBL) 5th Edition

Prevention Strategies for Seasonal Influenza in Healthcare Settings

Interim Guidance for Infection Control Within Healthcare Settings When Caring for Confirmed Cases, Probable Cases, and Cases Under Investigation for Infection with Novel Influenza A Viruses Associated with Severe Disease

Interim Infection Prevention and Control Recommendations for Hospitalized Patients with Middle East Respiratory Syndrome Coronavirus (MERS-CoV)

Ebola (Ebola virus disease)

Infection Prevention and Control Recommendations for Hospitalized Patients with Known or Suspected Ebola Hemorrhagic Fever in U.S. Hospitals

Guidance on Personal Protective Equipment To Be Used by Healthcare Workers During Management of Patients with Ebola Virus Disease in U.S. Hospitals, Including Procedures for Putting On (Donning) and Removing (Doffing)

CDC (Centers for Disease Control and Prevention). 2011. Immunization of Health-Care Personnel: Recommendations of the Advisory Committee on Immunization Practices (ACIP). Morbidity and Mortality Weekly Report 60(RR07); 1-45.

National Institute for Occupational Safety and Health (NIOSH)

Workplace Safety and Health Topics Page—Healthcare Workers

Workplace Safety and Health Topics Page—Ebola

Workplace Safety and Health Topics Page—Emerging Infectious Diseases

Workplace Safety and Health Topics Page—Hazardous Drug Exposures in Health Care

Workplace Safety and Health Topics Page—Seasonal Influenza (flu) in the Workplace

Workplace Safety and Health Topics Page—Severe Acute Respiratory Syndrome (SARS)

Workplace Safety and Health Topics Page—Tuberculosis

TB Respiratory Protection Program in Healthcare Facilities—Administrator's Guide, 1999

Recommended Guidance for Extended Use and Limited Reuse of N95 Filtering Facepiece Respirators in Healthcare Workers

Revised, Updated Resources Are Announced to Help Prevent Exposures of Emergency Response Employees to Infectious Diseases During Duty

Institute of Medicine (IOM)

Use and Effectiveness of Powered Air Purifying Respirators in Health Care

IOM Preventing Transmission of Pandemic Influenza and Other Viral Respiratory Diseases: Personal Protective Equipment for Healthcare Personnel Update 2010

World Health Organization (WHO)

Epidemic- and Pandemic-prone Acute Respiratory Diseases—Infection Prevention and Control in Health Care. Infection Control Aide-Memoire, World Health Organization, 2008

Epidemic- and Pandemic-prone Acute Respiratory Diseases—Infection Prevention and Control in Health Care. Summary Guidance, World Health Organization, 2007

The Joint Commission

Implementing Hospital Respiratory Protection Programs: Strategies from the Field

California Department of Public Health

Respirator Use in Health Care Workplaces—a Toolkit for Respirator Program Administrators
Guide and tools developed for use in California

Association of periOperative Registered Nurses

Guidelines for Perioperative Practice, 2015

General Respiratory Protection Resources

National Institute for Occupational Safety and Health (NIOSH)

Workplace Safety and Health Topics—Respirators

National Personal Protective Technology Laboratory

Respirator Trusted-Source Information Page

Respirator Selection Logic, 2004

Certified Equipment List Search—search for NIOSH-approved respirators by facepiece type, manufacturer and hazard

Getting optimal performance from a powered air-purifying respirator (PAPR) depends on the condition of its battery!

Occupational Safety and Health Administration (OSHA)

Safety and Health Topics: Respiratory Protection

Assigned Protection Factors for the Revised Respiratory Protection Standard, 2009 (PDF)

Respirator eTool—Learn how to select appropriate respirators and develop a change schedule for cartridges.

Small Entity Compliance Guide for the Respiratory Protection Standard, 2011 (PDF, 6MB)

Questions and Answers on the Respiratory Protection Standard, OSHA memorandum, 1998 (PDF)

American National Standards Institute (ANSI)

(Standards must be purchased to access online.)

ANSI/AIHA Z88.6-2006 Respiratory Protection—Respirator Use—Physical Qualifications for Personnel

ANSI/AIHA Z88.7-2010 Color Coding of Air-Purifying Respirator Canisters, Cartridges, and Filters

ANSI/AIHA Z88.10-2010 Respirator Fit Testing Methods

ANSI/ASSE Z88.2 Practices for Respiratory Protection

Medical and Industrial Hygiene Services

American Industrial Hygiene Association (AIHA) Consultants List—search by specialty for help with respiratory protection programs and fit testing.

OSHA On-site Consultation Program—offers free and confidential advice to small and medium-sized businesses in all states across the country, with priority given to high-hazard worksites.

The Association of Occupational and Environmental Clinics directory of member clinics—These clinics provide medical clearance for respirator use, may provide fit testing services, and meet certain criteria for quality patient care.

Administrative Resources

Respiratory Protection Program Evaluation Checklist & Instructions for Use (Appendix C)

Written Respiratory Protection Program Template (Appendix D)

Sample Respirator Fit Test and Training Verification Card (PDF)—developed by the Association of Occupational Health Professionals in Healthcare

Sample Respirator Fit Test Record (Word)—customizable for your respirator program (developed by the California Department of Public Health)

Training and Educational Resources

Occupational Safety and Health Administration (OSHA)

OSHA Training Institute (OTI)—searchable schedule of courses offered by the OTI Education Centers

Fact Sheet: Respiratory Infection Control: Respirators Versus Surgical Masks (PDF)—two-page explanation of when to use respirators and surgical masks

Respiratory Protection Videos (MPEG4 or YouTube)—website with 13 videos in English and Spanish

The Difference Between Respirators and Surgical Masks—English and Spanish videos

Respiratory Protection for Health Care Workers—download video or watch on YouTube

Respirator Safety: Donning and Doffing (WMV, 21MB)—English and Spanish videos

QuickCard on types of respirators (PDF)—one page reference on the different types of respirators

OSHA Best Practices for Hospital-Based First Receivers of Victims from Mass Casualty Incidents Involving the Release of Hazardous Substances, 2005

Susan Harwood Grantee Produced Training Materials

National Institute for Occupational Safety and Health (NIOSH)

NIOSH Science Blog: N95 Respirators and Surgical Masks—discussion of respirator and surgical mask history, fit and filter performance

NIOSH Science Blog: Do We Need to Challenge Respirator Filters With Biological Aerosols?—discussion of particle filtration as it relates to viruses and bacteria

Debunking the Myths Regarding N95 Respirator Use—N95 Day Webinar

Respirator Awareness: Your Health May Depend On It—Personal Protective Equipment for Healthcare Workers (PDF, 2.5 MB)

Listing of Approved Surgical N95 Filtering Facepiece Respirators with Donning/Doffing Instructions

How to Properly Put on and Take off a Disposable Respirator (PDF)—NIOSH factsheet in English and Spanish

Educational Resource Centers for Occupational Safety and Health—courses, seminars, and workshops for occupational health and safety professionals

Centers for Disease Control and Prevention (CDC)

CDC Tools for Protecting Healthcare Personnel—guidelines, slideshow, and resources on selecting and using personal protective equipment

Guidance for the Selection and Use of PPE (PPT, 1.5MB)

Sequence for Donning and Removing Personal Protective Equipment poster (PDF)—English and Spanish

AAOHN Respiratory Protection Education & Resources Webkit—a 10-module Respiratory Protection Course and accompanying resources

University of Wisconsin PAPR Training Workshop Presentation (PDF)—training on powered air-purifying respirators (PAPRs)

APIC-MDH PAPR Donning and Doffing Poster (PDF)—produced by the Association for Professionals in Infection Control and Epidemiology and the Minnesota Department of Health

Washington State Department of Labor and Industries Respirator Training Kit—training presentations for filtering facepiece, cartridge, and supplied-air respirators

Appendix A

Clinical Syndromes or Conditions Warranting Empiric Transmission-Based Precautions Pending Confirmation of Diagnosis[1, 2]

Clinical Syndrome or Condition[3]	Potential Pathogens[4]	Precautions, in Addition to Standard Precautions
Meningitis	*M. tuberculosis*	Airborne Precautions if pulmonary infiltrate Airborne Precautions plus Contact Precautions if potentially infectious draining body fluid present
Rash or Exanthems, Generalized, Etiology Unknown		
If positive history of travel to an area with an ongoing outbreak of viral hemorrhagic fever in the 10 days before onset of fever	Ebola, Lassa, Marburg viruses	Droplet Precautions plus Contact Precautions, with face/eye protection, emphasizing safety sharps and barrier precautions when blood exposure likely. Use N95 or higher respiratory protection when aerosol-generating procedure performed
Vesicular	Varicella-zoster, herpes simplex, variola (smallpox), vaccinia viruses	Airborne plus Contact Precautions
Maculopapular with cough, coryza and fever	Rubeola (measles) virus	Airborne Precautions
Respiratory Infections		
Cough/fever/upper lobe pulmonary infiltrate in an HIV-negative patient or a patient at low risk for HIV infection	*M. tuberculosis*, Respiratory viruses, S. pneumoniae, *S. aureus* (MSSA or MRSA)	Airborne Precautions plus Contact Precautions

Clinical Syndrome or Condition[3]	Potential Pathogens[4]	Precautions, in Addition to Standard Precautions
Cough/fever/pulmonary infiltrate in any lung location in an HIV-infected patient or a patient at high risk for HIV infection	*M. tuberculosis*, Respiratory viruses, S. pneumoniae, *S. aureus* (MSSA or MRSA)	Airborne Precautions plus Contact Precautions Use eye/face protection if aerosol-generating procedure performed or contact with respiratory secretions anticipated. If tuberculosis is unlikely and there are no AIIRs and/or respirators available, use Droplet Precautions instead of Airborne Precautions. Tuberculosis more likely in HIV-infected individual than in HIV negative individual.
Cough/fever/pulmonary infiltrate in any lung location in a patient with a history of recent travel (10-21 days) to countries with active outbreaks of SARS or avian influenza	*M. tuberculosis*, severe acute respiratory syndrome virus (SARS-CoV), avian influenza	Airborne plus Contact Precautions plus eye protection. If SARS and tuberculosis unlikely, use Droplet Precautions instead of Airborne Precautions.

[1] Abbreviated and based on Table 2: Clinical Syndromes Or Conditions Warranting Empiric Transmission-Based Precautions In Addition To Standard Precautions Pending Confirmation Of Diagnosis from Appendix A of CDC and HICPAC's 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings. This table is not up-to-date on current pathogens of concern; therefore, public health guidance must be regularly reviewed to understand the potential pathogens and recommended precautions. For examples, see CDC's latest guidance for novel influenza A viruses associated with severe disease, Middle East Respiratory Syndrome Coronavirus, and Ebola virus disease.

[2] Infection control professionals should modify or adapt this table according to local conditions. To ensure that appropriate empiric precautions are always implemented, hospitals must have systems in place to evaluate patients routinely according to these criteria as part of their preadmission and admission care.

[3] Patients with the syndromes or conditions listed below may present with atypical signs or symptoms. The clinician's index of suspicion should be guided by the prevalence of specific conditions in the community, as well as clinical judgment.

[4] The organisms listed under the column "Potential Pathogens" are not intended to represent the complete, or even most likely, diagnoses, but rather possible etiologic agents that require additional precautions beyond Standard Precautions until they can be ruled out.

Appendix B

OSHA Assigned Protection Factors[1, 2]

Type of respirator[3, 4]	Quarter mask	Half mask	Full facepiece	Helmet/ hood	Loose-fitting facepiece
Air-Purifying Respirator	5	[5]10	50		
Powered Air-Purifying Respirator (PAPR)		50	1,000	[6]25/1,000	25
Supplied-Air Respirator (SAR) or Airline Respirator					
• Demand mode		10	50		
• Continuous flow mode		50	1,000	[6]25/1,000	25
• Pressure-demand or other positive-pressure mode		50	1,000		
Self-Contained Breathing Apparatus (SCBA)					
• Demand mode		10	50	50	
• Pressure-demand or other positive-pressure mode (e.g., open/closed circuit)			10,000	10,000	

[1] These APFs do not apply to respirators used solely for escape. For escape respirators used in association with specific substances covered by 29 CFR 1910 subpart Z, employers must refer to the appropriate substance-specific standards in that subpart. Escape respirators for other immediately dangerous to life or health atmospheres are specified in 29 CFR 1910.134 (d)(2)(ii).

[2] Based on Table 1. Assigned Protection Factors in OSHA's Respiratory Protection standard.

[3] Employers may select respirators assigned for use in higher workplace concentrations of a hazardous substance for use at lower concentrations of that substance, or when required respirator use is independent of concentration.

[4] The assigned protection factors in Table 1 are only effective when the employer implements a continuing, effective respirator program as required by this section (29 CFR 1910.134), including training, fit testing, maintenance, and use requirements.

[5] This APF category includes filtering facepieces, and half masks with elastomeric facepieces.

[6] The employer must have evidence provided by the respirator manufacturer that testing of these respirators demonstrates performance at a level of protection of 1,000 or greater to receive an APF of 1,000. This level of performance can best be demonstrated by performing a Workplace Protection Factor or Simulated Workplace Protection Factor study or equivalent testing. Absent such testing, all other PAPRs and SARs with helmets/hoods are to be treated as loose-fitting facepiece respirators, and receive an APF of 25.

Appendix C

Respiratory Protection Program Evaluation Checklist and Instructions for Use

	Yes	No
1. Is there a written policy which acknowledges employer responsibility for providing a safe and healthful workplace?	☐	☐
2. Has a suitably trained individual been designated as the respirator program administrator (RPA) with overall responsibility for development and implementation of the respiratory protection program?	☐	☐
Does the written respiratory protection program include the following required elements? (items 3-12)		
3. written designation of a program administrator;	☐	☐
4. an evaluation of hazards and identification of appropriate respirators for specific job classifications and/or tasks;	☐	☐
5. procedures for medical evaluations of employees required to use respirators;	☐	☐
6. fit testing procedures for tight-fitting respirators;	☐	☐
7. procedures for proper use of respirators;	☐	☐
8. procedures and schedules for storage, inspection, cleaning, and maintenance of respirators;	☐	☐
9. procedures for training employees regarding the respiratory protection program;	☐	☐
10. a description of the training curriculum;	☐	☐
11. procedures for voluntary use of respirators; and	☐	☐
12. procedures for regular evaluation of the program.	☐	☐
13. Is the written program readily available to any employee included in the program?	☐	☐

	Yes	No
14. Is there a record of medical clearance for each employee required to wear a respirator?	☐	☐
15. Is there a record of a fit test or fit test screening for each respirator user within the last year?	☐	☐
16. Have users been trained in the proper use, maintenance, cleaning, and inspection of respirators?	☐	☐
17. Have workers been trained on the respiratory hazards to which they are potentially exposed during routine and emergency situations?	☐	☐
18. Are workers prohibited from wearing respirators with a tight-fitting facepiece if they have facial hair or other characteristics which may cause face seal leakage?	☐	☐
19. Are respirators stored appropriately so as to prevent them from becoming damaged or deformed?	☐	☐
20. Are the users wearing the respirator for which they have passed a fit test?	☐	☐
21. Are N95, or more protective, respirators always worn by employees in areas occupied by a suspected or confirmed case of airborne infectious disease?	☐	☐
22. Are PAPRs always worn by employees in areas where an aerosol-generating procedure is being performed on a suspected or confirmed case of airborne infectious disease? (An N95 respirator is the minimum level of respiratory protection required, except in California where a PAPR is required.)	☐	☐
23. Are N95, or more protective, respirators always worn by employees in areas where a high-hazard procedure is being performed on a suspected or confirmed case of seasonal influenza?	☐	☐
24. Are respirators inspected by the users before each use?	☐	☐
25. Are respirators being put on (donned) and taken off (doffed) correctly?	☐	☐
26. Are respirators cleaned and disinfected as often as necessary, including before being worn by a different individual?	☐	☐
27. Is there a mechanism for users to report problems with respirator use?	☐	☐
28. Is there a mechanism for users to provide feedback about the effectiveness of the program?	☐	☐

RPP Evaluation Checklist Instructions

This checklist should be completed and used to update any deficiencies in the program on a regular basis. Any changes made to the program should be documented and kept on file with the written program, which must be available to all employees. List the changes or improvements that need to be made to the program.

1. Every employer has a legal obligation to provide and maintain a safe and healthful workplace for employees, according to the *Occupational Safety and Health Act of 1970*. This obligation should be stated in writing as a reason for developing and implementing a respiratory protection program (RPP), and can serve as the opening paragraph of your written RPP. If you do not have such a policy in writing for your facility, it would be a good idea to develop one as a preface to all of your health and safety programs.

2. Asks whether management has designated an appropriate person to be held accountable for implementing the respiratory protection program. The OSHA standard requires the employer to designate a respirator program administrator (RPA) to be "qualified by appropriate training or experience that is commensurate with the complexity of the program." The RPA should have an understanding of the principles of respiratory protection and of the requirements of the OSHA Respiratory Protection standard (29 CFR 1910.134). If your RPA is not a health and safety professional, he or she might need some additional training to effectively carry out their responsibilities.

   The OSHA Respiratory Protection standard (Standard) requires all employers with employees who are required to use respiratory protection to have a written RPP. Items **3-12** refer to the written program. Check the written RPP to be sure each of the required elements is present and in compliance with the Standard.

3. One individual should be identified either by name or job title as the RPA. If additional people have key responsibilities for the RPP, their names and roles may be listed as well.

4. The employer shall select and provide an appropriate respirator based on the respiratory hazards to which the worker is exposed and workplace and user factors that affect respirator performance and reliability. The hazard evaluation or respirator selection section of the RPP should include a list of job titles, tasks or both and identify the type of respirator required for each. This should be the general type of respirator (e.g., filtering facepiece respirator or PAPR), not the specific make and model.

5. Written procedures should address how employees are to obtain and complete the questionnaire, who will evaluate the questionnaire, who will do exams when necessary, how clearance will be reported, and how records will be kept. You may attach or copy and paste the questionnaire from the Standard.

6. Written fit test procedures should address the following questions. Who will do the fit test? What protocol will be used? You may copy and paste or attach the protocol from the Standard. What will happen if someone fails the fit test? How are records kept?

7. Procedures for use should include policies for prohibition of use (e.g., facial hair), procedures for proper use including inspection of the respirator, seal checks, proper technique for putting on and taking off the respirator, etc.

8. Procedures should address appropriate storage, maintenance, disposal, and/or cleaning and disinfecting of all types of respirators used at the facility.

9. The training section of the RPP should include the procedures for training (e.g., who will do it and how often).

10. The training section should also include the training curriculum, which must include: the hazards to which employees are exposed; the procedures for proper use and maintenance of respirators; and the limitations of the respirators being used.

11. In instances when respirators are not required by OSHA or the RPP, the Standard allows employers to provide respirators to employees who choose to wear them voluntarily. When such voluntary use is allowed, the employer must implement written procedures to ensure that employees are medically able to use a respirator and that the respirator is cleaned, stored, and maintained in such a manner that it does not create a health hazard. These procedures are not required for employees who only use filtering facepiece respirators voluntarily. The employer must also provide the voluntary user with a copy of Appendix D, Information for Employees Using Respirators When not Required Under the Standard, of OSHA's Respiratory Protection standard.

12. Procedures for periodic evaluation of the RPP must be in writing and must include procedures for obtaining feedback from employees as part of the evaluation process.

Item **13** addresses the requirement that the written RPP must be available for review to anyone in the program and OSHA. It may be in a central file accessible to employees, or it may be available in electronic format, but users must know where to find it.

In order to answer questions **14** and **15**, you will need to pull the records on medical evaluations and fit tests and make sure that they are comprehensive. If records are missing for any employees wearing respirators, you must determine immediately whether the records are simply missing, or if the person has really not been evaluated or fit tested. Any time you discover missing records, you should rectify this immediately.

Questions **16** and **17** may also be answered by reviewing records or observing respirator use. You should consider either tracking training electronically or by keeping a physical training roster in a file so that you can easily determine who has and has not been trained and when training is due. If there is anyone wearing a respirator who has not been trained, this should also be rectified immediately.

In order to answer questions **18-26**, you will need to go to the units and observe the program in action. Watch carefully to ascertain whether or not the procedures in the written program are being followed. If they are not, you will need to determine whether additional training is needed or whether your procedures should be revised.

Items **27** and **28** address procedures for communication and feedback that should be in place for employees covered by the RPP.

27. Addresses whether or not there is a way for users to report any specific problems they are having on a day-to-day basis. Is their model and size of respirator unavailable? Are the straps of their filtering facepiece respirator breaking during donning? Are they experiencing discomfort or difficulty breathing when wearing respirators for required time periods? Are they unable to get a good seal when they perform a seal check? Do they know who to report these problems to?

28. Addresses whether or not employees are involved in the periodic evaluation of the program. Is there a way for them to communicate general problems or ideas for improvement to the RPA so that appropriate changes to the program will be considered when the program is evaluated?

Appendix D

Respiratory Protection Program Template for Hospitals

Use of this template does not guarantee compliance with OSHA standards, but it is meant to help hospitals fulfill the **requirement for a written respiratory protection program as one component of a comprehensive program to protect their employees**. It is important that you reference 29 CFR 1910.134, the Federal OSHA Respiratory Protection standard, (or the equivalent state OSHA standard) for details on specific OSHA requirements. This template is provided for public use and is not protected by copyright. You have permission to edit and use this template as a resource in developing a written respiratory protection program for your facility.

Instructions

This template is designed for use by personnel who have been suitably trained and charged with the responsibility of developing and implementing a respiratory protection program (RPP) that addresses exposure to aerosol transmissible disease (ATD) pathogens and other respiratory hazards in hospital work environments. It is designed to be used in conjunction with the "Hospital Respiratory Protection Program Toolkit: Resources for Respirator Program Administrators," which provides detailed instructions and tips for program development specifically in hospitals. Use of this template does not guarantee compliance with OSHA standards, but it is meant to help hospitals fulfill the requirement for a written RPP as one component of a comprehensive program to protect their employees. It is important that you reference 29 CFR 1910.134, the Federal OSHA Respiratory Protection standard, (or the equivalent state OSHA standard) for details on specific OSHA requirements.

Before considering the use of respirators, keep in mind that you must first implement, where feasible, engineering, work practice and administrative controls as the means to prevent or reduce exposures, and only look at respiratory protection as a last line of defense when exposures cannot be eliminated or substantially reduced in frequency and duration by using these other methods.

As you prepare to develop your program, you must consider whether you will have one comprehensive RPP for the entire hospital, which would cover all inhalation hazards, including infectious agents and chemical exposures, or whether you will have an RPP for chemical exposures and a separate one for exposure to infectious agents. Your decision may depend on the size of your facility and the number of staff with exposure to various inhalation hazards. A single RPP with one program administrator is preferred, to ensure consistency and accountability. However, if two separate RPPs and program administrators exist to cover respirator responsibilities for chemical and infectious exposures, the employer must ensure that overall policies are coordinated, adequate technical expertise is available for each program, and that all aspects of both programs are effectively implemented. Keep in mind that a respirator program encompassing chemical hazards will need to address additional issues beyond solely addressing ATD pathogens.

The OSHA Respiratory Protection standard (29 CFR 1910.134) requires employers to include certain policies and procedures in their RPP, but there is some flexibility in the content of those policies and procedures. What might work well for one hospital may not work at all for another. For this reason, the template is designed to be flexible and it is made available as an editable Microsoft Word document that each hospital can customize to meet its specific needs. **Your paramount goal is to develop a site-specific RPP that can be effectively implemented.**

There are places throughout the document where you will need to fill in a blank or change a generic placeholder (such as ABC Hospital) to customize it to your facility. These **placeholders and blanks** are always in **{bold curly brackets}**, so that you can find them easily and replace them with the appropriate black text.

Use of this template does not guarantee compliance with OSHA standards, but it is meant to help hospitals fulfill the **requirement for a written respiratory protection program as one component of a comprehensive program to protect their employees**. It is important that you reference 29 CFR 1910.134, the Federal OSHA Respiratory Protection standard, (or the equivalent state OSHA standard) for details on specific OSHA requirements. This template is provided for public use and is not protected by copyright. You have permission to edit and use this template as a resource in developing a written respiratory protection program for your facility.

You will also notice text enclosed in ***[bold, italic square brackets]*** in many places throughout the document. This text gives you **instructions, tips, or ideas** for customizing sections that you might want to change. *Make sure to remove the red text in your final document.*

Remember – this template is meant to be used as a helpful guideline for developing your RPP. You may be able to use it with minimal modification, but you will need to change the wording or organization to be specific to your facility and include your site-specific procedures and policies. Make sure that you include each section that is in the template since these components are required by OSHA's Respiratory Protection standard (29 CFR.1910.134).

Use of this template does not guarantee compliance with OSHA standards, but it is meant to help hospitals fulfill the **requirement for a written respiratory protection program as one component of a comprehensive program to protect their employees**. It is important that you reference 29 CFR 1910.134, the Federal OSHA Respiratory Protection standard, (or the equivalent state OSHA standard) for details on specific OSHA requirements. This template is provided for public use and is not protected by copyright. You have permission to edit and use this template as a resource in developing a written respiratory protection program for your facility.

Respiratory Protection Program

{ABC Hospital}

Updated {Hospital Provide Date}

[We recommend updating the RPP annually or as necessary to reflect changes in workplace conditions that affect respirator use.]

Use of this template does not guarantee compliance with OSHA standards, but it is meant to help hospitals fulfill the **requirement for a written respiratory protection program as one component of a comprehensive program to protect their employees**. It is important that you reference 29 CFR 1910.134, the Federal OSHA Respiratory Protection standard, (or the equivalent state OSHA standard) for details on specific OSHA requirements. This template is provided for public use and is not protected by copyright. You have permission to edit and use this template as a resource in developing a written respiratory protection program for your facility.

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1.0 Purpose and Applicability

It is the policy of **{ABC Hospital}** to protect the health and safety of its employees by (1) eliminating hazardous exposures where feasible; (2) using engineering and administrative controls to minimize hazardous exposures that cannot be eliminated; and (3) using respiratory protection and other personal protective equipment when the frequency and duration of exposures cannot be substantially reduced or eliminated.

The purpose of this respiratory protection program (RPP) is to maximize the protection afforded by respirators when they must be used. It establishes the procedures necessary to meet the regulatory requirements described in OSHA's Respiratory Protection standard (29 CFR 1910.134) ***[Note: as the employer, you are ultimately responsible for ensuring that is indeed the case. If applicable, replace references to the Federal OSHA standard with your state standard.]***

This program applies to all employees and contractors who are required to wear respiratory protection due to the nature of their work at **{ABC Hospital}**. It applies to the use of air-purifying and air-supplying respirators, including filtering facepiece respirators. If Self-Contained Breathing Apparatus (SCBA) are to be used, significant additions to this RPP will be necessary to achieve compliance with 29 CFR 1910.134 requirements (see note in section 3.2).

[Note: You must provide a description of how your facility has decided to handle respiratory protection for healthcare workers who are contractors, nursing registries, and other non-employees. Are contractors held to their own RPP and if so, how? Via contract? How will you ensure the adequacy of their RPP? Will staff from a temporary agency or registry be included with hospital employees in all aspects of the hospital RPP, training, fit testing, etc., or are responsibilities divided in some way? You must have a clear policy that ensures all healthcare workers are adequately protected and describe it in writing.]

2.0 Responsibilities

[You may choose to assign responsibilities differently than below as long as someone is responsible for each of the components of the program]

2.1 Respirator Program Administrator

[This should be an individual (either a name or a job title or both) rather than a department or group of administrators, and affected employees need to know who that person is.] **{XXXXXX,}** has been designated as the respirator program administrator (RPA). The RPA has received appropriate training and is knowledgeable about the requirements of the OSHA Respiratory Protection standard and all elements of the respiratory protection program that need to be implemented to be effective. Hospital administration has the ultimate responsibility for all aspects of this program and has given **{him/her}** full authority to make the necessary decisions to ensure its success. This authority includes, but is not limited to, conducting hazard assessments for selecting appropriate respiratory protection, purchasing the necessary equipment and supplies, and developing and implementing the policies and procedures described in the written RPP.

Specifically, the RPA or other staff in conjunction with the RPA will, in accordance with OSHA's Respiratory Protection standard (29 CFR 1910.134):

- Conduct a hazard assessment and select the appropriate level of respiratory protection for each task or job title with potential exposure and record this information in the "Respirator Assignments by Task or Location" in Appendix A of this RPP.
- Develop and monitor respirator maintenance procedures.
- Coordinate the purchase, maintenance, repair, and replacement of respirators.

- Routinely evaluate the effectiveness of the RPP, with employee input, and make any necessary changes to the program.
- Provide or arrange for annual training on the use and limitations of respirators.
- Ensure that medical evaluations are provided.
- Ensure that annual respirator fit testing is provided.
- Maintain records of respirator training, medical clearance, and fit testing as required by 29 CFR 1910.134 and 29 CFR 1910.1020.
- Maintain a copy of this written RPP and program evaluations, and ensure that they are readily accessible to anyone in the program.

2.2 Supervisors

Supervisors of employees included in the RPP will:

- Participate in the hazard assessment by evaluating all potential exposures to respiratory hazards, including exposure to chemicals and aerosol transmissible disease (ATD) pathogens, and communicating this information to the RPA.
- Identify employees and/or tasks for which respirators may be required and communicate this information to the RPA. ***[This will be a shared responsibility with the RPA since the supervisor knows the day-to-day jobs/tasks their employees do, but the RPA may have more knowledge about respiratory protection requirements.]***
- Be responsible for ensuring that employees in their units follow the procedures outlined in the RPP. Schedule employees for medical evaluations, training, and fit testing and ensure that they are allowed to attend these appointments during work hours.

2.3 Employees in the Program

Employees assigned to jobs/tasks requiring the use of a respirator will:

- Complete the required questionnaire for medical clearance and participate in a medical examination if necessary.
- Adhere to hospital policies on facial hair and respirator seal protection.
- Attend annual training and respirator fit testing as required in the RPP.
- Use, maintain, and dispose of respirators properly in accord with training and the procedures in the RPP.

3.0 Respirator Selection

[You may remove any mention of types of respirators that are not used at your facility.]

3.1 Hazard Assessment

The RPA will select the types of respirators to be used by hospital staff based on the hazards to which employees may be exposed and in accord with OSHA regulations and Centers for Disease Control and Prevention (CDC), Healthcare Infection Control Practices Advisory Committee (HICPAC), and other public health guidelines. With input from the respirator user, the RPA and supervisor will conduct a hazard assessment for each task, procedure, or work area with the potential for airborne contaminants. The hazard assessment will include the following as needed:

- Identification of potential exposures. The most common potential exposure for employees involved in patient care will be pathogens associated with ATDs such as tuberculosis. Maintenance, housekeeping, laboratory, or other staff may have the potential to be exposed to hazardous gases, vapors, or dusts in addition to ATD pathogens.

- A review of work processes to determine levels of potential exposure for all tasks and locations.
- Quantification or objective determination of potential exposure levels, where possible. This may not be feasible for ATD pathogens.

3.2 NIOSH-Certified Equipment

All respiratory protective equipment shall be approved by the National Institute for Occupational Safety and Health (NIOSH) for the configuration and environment in which it is going to be used. The NIOSH Certified Equipment List is found at the following Internet address: www.cdc.gov/niosh/npptl/topics/respirators/cel.

The following definitions apply to equipment that may be issued to employees under this program:

- **Air-purifying respirators (APR)** are respirators with a filter, canister, or cartridge that removes specific air contaminants from the ambient air by passing through an air-purifying element. APRs must have been tested and approved by NIOSH for use in specific types of contaminated atmospheres. These respirators do not supply oxygen and therefore cannot be used to enter an atmosphere that is oxygen-deficient.

    - **Filtering facepiece respirators (FFR)** are disposable, negative-pressure, air purifying respirators where an integral part of the facepiece or the entire facepiece is made of filtering material. These respirators are designed to be used once and then properly disposed of. However, a FFR may be reused by the same user, under some circumstances, as long as the respirator has not been obviously soiled or damaged (See discussion of specific conditions in which FFR reuse may be acceptable in section 8.1). An N95 FFR has a filter efficiency of 95% and is not resistant to oil, while a P100 FFR has a filter efficiency of 99.97% and has a strong resistance to oil. Filters with other combinations of filtration efficiency and oil resistance, “N”, “R” or “P”, categories are available. [You must provide clear guidance on when FFRs will be discarded. You may allow employees to wear the same FFR while carrying out a number of tasks, requiring it to be discarded after it is removed; or, for infection control reasons, you may want to have employees discard FFRs between patients.]

    - **Half mask elastomeric respirators** are reusable air-purifying respirators that fit over the nose and mouth. They are made of rubber or silicone with attached cartridges or filters for removal of gases, vapors, or dusts.

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

    - **Full facepiece elastomeric respirators** are reusable air-purifying respirators that cover the face from the forehead to the chin. They are made of rubber or silicone with a clear plastic lens and have attached cartridges or filters for removal of gases, vapors, or dusts.

- **Powered air-purifying respirators (PAPR)** are air-purifying respirators that use a blower to force ambient air through air-purifying elements and into the respirator facepiece, helmet, or hood.

- **Air-supplying respirators** (also known as atmosphere-supplying respirators) have a source of breathing air that is independent from the work area and supplied to the wearer’s facepiece. These include two main types:
    - Supplied-air respirators (SARs) are connected to a free-standing cylinder of breathing air, an air compressor, or a system piping breathing air through the building.

- Self-contained breathing apparatus (SCBA) are usually equipped with a full facepiece and have a tank of breathing air worn on the back of the user, and escape respirators which have a small supply of air designed to last a short period of time to allow the user to leave the hazardous area. Air-supplying respirators will not be used for routine healthcare procedures, but may be used by emergency responders. ***[Note: If this type of respirator is going to be used, significant additions to this RPP will be necessary to achieve compliance with 29 CFR 1910.134 requirements relative to air source, etc.]***

3.3 Assignment of Respirators by Task and Location

The RPA will use the hazard assessment to assign appropriate types of respirators for use by specific types of personnel during specific procedures or in specific areas of the hospital. These assignments are listed in Appendix A of this RPP.

3.4 Updating the Hazard Assessment

The RPA will revise and update the hazard assessment any time an employee or supervisor identifies or anticipates a new exposure or changes to existing exposures. Any employee who believes that respiratory protection is needed during a particular activity must contact his or her supervisor or the RPA. The supervisor must contact the RPA whenever respiratory protection is requested. The RPA will assess the potential hazard with the employee and supervisor. If it is determined that respiratory protection is needed, all elements of this program will be in effect for those tasks and the program will be updated accordingly.

3.5 Voluntary Use of Respirators

[You may choose whether or not to allow voluntary use. If you do not allow it, you may remove this section of the program]

When the use of a respirator is not required by a substance-specific OSHA standard, the OSH Act or hospital policies and the RPA has determined that its use is not necessary to protect the health of the employee, an employee may still request to use a respirator voluntarily.

Employees using respirators voluntarily will be provided with the information in Appendix D to 29 CFR 1910.134 (Appendix B of this RPP). If they are using a respirator other than a filtering facepiece respirator, they will also be provided initial medical clearance and required to clean, store, and maintain the respirator as per the requirements of this RPP. Employees who choose to voluntarily use respirators should advise their supervisor of the need to be included in the applicable sections of the respirator program. If approved, the employees using a respirator other than a filtering facepiece respirator are required to attend annual training provided to those in the full respirator program, as 29 CFR 1910.134(k)(1)(v) requires training in the procedures for cleaning, maintenance and storage of the respirator. If employees voluntarily using respirators are aware of a change that warrants review of medical clearance or repeat fit testing, they should bring that to the attention of their supervisor**. [You may choose to fit test voluntary users, but this is not required. In the hospital setting, most voluntary use is by employees who are already included in the RPP and simply choose to wear the same type of respirator more often than is required. In this case, procedures for voluntary use are not necessary.]**

4.0 Medical Evaluation

Employees whose work activities require the use of respiratory protective equipment shall receive medical clearance prior to the use of a respirator and prior to being fit tested for a respirator.

Medical evaluations will be performed by a physician or other licensed health care professional (PLHCP) at **{ABC Hospital Occupational Health Clinic}**. ***[This can be the hospital's occupational employee health service or clinic, or another provider of your choice as long as the evaluations are kept medically confidential, conducted by an individual licensed in your state to perform such evaluations, and are provided at no cost to the employee. To ensure the confidentiality of medical information, the medical evaluation should not be conducted by the employee's immediate supervisor and others in the employee's direct line of authority.]***

Before being assigned to work in an area where respirators are required, each employee will complete the questionnaire in Appendix C of this RPP and deliver it to **{ABC Hospital Occupational Health Clinic}**. ***[Any other questionnaire may also be used, as long as it includes the same information as the questionnaire provided in Appendix C of the OSHA Respiratory Protection standard.]*** Employees may also speak directly with the PLHCP if they have questions. The PLHCP will be provided with a copy of the RPP, information from the RPA about the type of respiratory protection to be used by employees, duration and frequency of respirator use, expected physical effort, other protective equipment worn, and any expected extremes of temperature or humidity.

The PLHCP will review completed questionnaires and make a medical determination as to whether the employee can wear a respirator safely. The PLHCP may make this determination based on the questionnaire alone, but may also require a physical examination of the employee and any tests, consultations, or procedures the PLHCP deems are necessary. The PLHCP will provide a written recommendation to the employer, which may clear the employee for all respirator use, or may specify restrictions or limitations on use, such as the type of respirator that may be worn, the duration that it may be worn, and the acceptable level of exertion while wearing the respirator. A copy of this written determination shall also be provided by the PLHCP to the employee.

An additional medical evaluation is required when:

- The employee reports medical signs or symptoms that are related to the ability to use a respirator.
- A PLHCP, supervisor, or the RPA requests a reevaluation.
- Observations made during fit testing or program evaluation indicate a need for reevaluation (e.g., the employee experiences claustrophobia or difficulty breathing during the fit test).
- A change occurs in workplace conditions (e.g., physical work effort, protective clothing, or temperature) that may result in a substantial increase in the physiological burden placed on an employee wearing a respirator.

5.0 Fit Testing

Before an employee is required to use any respirator with a tight-fitting facepiece (anything except a PAPR with loose-fitting facepiece, hood, or helmet that does not rely upon a tight-fitting facepiece-to-face seal), she/he will be fit tested by ***[Insert who will be doing the fit testing. This may be your employee health or infection control department, a unit supervisor, or an outside consultant. There is no requirement for certification of fit testers but you must be sure that the person doing the fit testing understands and follows the fit test protocol and understands how to train the wearer to don the respirator properly and do a user seal check. At least 15 minutes per person will be needed to show the employee how to put the respirator on, position it, and assess its comfort, perform the user seal check, and complete the fit testing. Providing these instructions during fit testing is considered a review and may not constitute the subject's formal training on respirator use.]*** **{XXXXXX}** with the same make, model, style, and size of respirator to be used. Employees who use tight-fitting respirators are not permitted to have facial hair that interferes with the facepiece seal or valve function.

All employees who must wear respiratory protection shall receive medical clearance before fit testing is performed or the respirator is worn. Fit tests will be provided at the time of initial assignment and annually thereafter. Additional fit tests will be provided whenever the employee experiences or the supervisor or RPA observes physical changes that could affect respirator fit. These changes include, but are not limited to, facial scarring, dental changes, cosmetic surgery, or an obvious change in body weight.

Employees who will be using only a PAPR with loose-fitting facepiece, hood, or helmet do not need to be fit tested. Any employee who cannot be successfully fit tested with a tight-fitting respirator may be assigned a PAPR with a loose-fitting facepiece, hood, or helmet for all tasks requiring a respirator. ***[Insert your policy here. There is flexibility here for you to formulate your own policy regarding facial hair and people who cannot pass a fit test with any of the tight-fitting respirators you have available. Providing a PAPR may be the simplest solution, but one that has other costs. You may require employees to be clean-shaven where the respirator seals to the face, but you must be prepared to enforce that policy. You may also choose to reassign employees who can't wear tight-fitting respirators to areas without exposure.]***

Employees will be offered a selection of several models and sizes of respirators from which they may choose the one that correctly fits and is most acceptable/comfortable.

A qualitative fit test may be used for all wearers of half mask APRs, including filtering facepiece respirators with N95 or P100 filters and elastomeric APRs. The qualitative test will follow the protocol **{for saccharine or Bitrex® solutions}** ***[choose one and delete the other]*** found in Appendix A of the OSHA Respiratory Protection standard (29 CFR 1910.134) and in Appendix D of this RPP. Another available test is the quantitative ambient aerosol condensation nuclei counter (CNC) fit testing protocol **[choose if applicable]** and can be used to replace the qualitative test ***[If you will be using a quantitative test, indicate the chosen protocol from Appendix A of the OSHA standard here and in Appendix D of this RPP.]***

6.0 Training

Annual respirator training will be provided for all employees covered by this program. The training will be conducted by **{XXXXXXXX}** ***[Insert who will be doing training]*** and will include the following:

- The general requirements of the OSHA Respiratory Protection standard.
- The specific circumstances under which respirators are to be used.
- Respiratory hazards to which employees are potentially exposed during routine and emergency situations.
- Why the respirator is necessary and how proper fit, usage, and maintenance can ensure the protective effect of the respirator as well as how improper fit, usage or maintenance can compromise the protective effect of the respirator.
- The limitations and capabilities of the respirators that will be used.
- How to effectively use the respirators, including emergency situations and situations in which the respirator malfunctions.
- How to inspect, put on, remove, use, and check the seals of the respirator (for tight-fitting respirators such as N95 filtering facepiece respirators).
- The procedures outlined in this program for maintenance, storage, and cleaning or disposal of respirators. Employees who are issued PAPRs shall be instructed in procedures for charging and maintaining the batteries, and for checking the air flow rate.
- How to recognize medical signs and symptoms that may limit or prevent the effective use of respirators.
- How and when to decontaminate (or safely dispose of) a respirator that has been contaminated with chemicals or hazardous/infectious biological materials.

Training shall be provided at the time of initial assignment to respirator use, but before actual use, and annually thereafter.

Additional training will be provided when there is a change in the type of respiratory protection used, or when inadequacies in the employee's knowledge or use of the respirator indicate that he or she has not retained the requisite understanding or skill.

The employee will also receive training during the fit testing procedure that will provide an opportunity to handle the respirator, have it fitted properly, test its facepiece-to-face seal, wear it in normal air to familiarize themselves with the respirator, and finally to wear it in a test atmosphere. Every respirator wearer will receive fitting instructions, including demonstrations and practice in how the respirator should be worn, how to adjust it, and how to perform a user seal check according to the manufacturer's instructions (see Appendix E of this RPP). ***[Generally, the hands-on training provided during fit testing does not meet the requirements of the standard and a separate training session will be necessary. Appendix E of this RPP currently contains mandatory Appendix B-1 of the Respiratory Protection standard on User Seal Check Procedures. Manufacturers of filtering facepiece respirators often provide their own recommended procedures for user seal checks. You should insert copies of the applicable respirator manufacturers' instructions for user seal checks in Appendix D of the RPP.]***

Employees will be given the opportunity during training, annual retraining and throughout the year to provide feedback on the effectiveness of the program and suggestions for its improvement. ***[The standard requires that you get feedback from employees when evaluating your program and it makes sense to gather the feedback at the annual training. However, you may choose some other mechanism for obtaining feedback.]***

7.0 Respirator Use

Employees will follow procedures for proper use of their respirators under conditions specified by this program and in accord with the training they receive on the use of each particular model or type of respirator. The appropriate types of respirators to be used and the exposure conditions are listed in the respirator selection chart in Appendix A of this RPP.

Respirators relying on a tight facepiece-to-face seal must not be worn when conditions prevent a good seal. Such conditions may be a beard, long moustache, sideburns, or even razor stubble as well as scars, other facial deformities, piercings, and temple pieces on glasses. In addition, the absence of one or both dentures can seriously affect the fit of a facepiece.

Employees and supervisors are expected to be diligent in observing practices pertaining to ensuring the safe use of respirators. To ensure proper protection, the wearer will perform a user seal check, in accord with manufacturer's instructions and the training provided at the time of fit testing, each time he or she puts on a tight-fitting respirator. Employees who wear corrective glasses or other personal protective equipment must wear these during their fit testing to ensure that it does not interfere with the facepiece seal.

When respirators with cartridges are used, the RPA shall determine a cartridge change schedule, which will be included in Appendix A. Odor or taste may not be used as the primary basis for determining the useful life of a cartridge for gases or vapors. In addition to the manufacturer's recommendations, the NIOSH Respirator Selection Logic and Federal OSHA Respirator e-Tool can aid in the development of a change schedule for cartridges. ***[If your facility only has filtering facepiece respirators then you may leave this out.]*** When filtering facepiece respirators are used, respirators should be discarded after each use or sooner if breathing becomes difficult or if the respirator is damaged, soiled, or contaminated.

Employees must leave the respirator use area:

- To adjust their respirator if the respirator is not fitting correctly or impeding their ability to work.
- To wash their face if the respirator is causing discomfort or rash.
- To change the respirator, filters, cartridges, or canister elements.
- To inspect the respirator if it stops functioning as intended, such as detection of vapor or gas breakthrough, changes in breathing resistance or leakage of the facepiece (e.g., fogging of eyeglasses).

8.0 Storage, Reuse, Maintenance and Care of Respirators

8.1 Storage and Reuse

Reusable respirators will be stored in a manner to protect them from damage, contamination, dust, sunlight, extreme temperatures, excessive moisture, and damaging chemicals.

When caring for infectious patients, disposable filtering facepiece respirators will be discarded after each use (i.e., patient encounter). It should be noted that Tuberculosis is not transmitted via contact and, therefore, reuse by the same wearer in the care of the same patient is acceptable as long as the filtering facepiece respirator is not damaged or soiled. The respirator must be discarded when it is no longer in its original working condition, whether that condition results from contamination, structural defects, or wear. ***[The RPA must describe the facility policies regarding when FFRs will be used and discarded. This includes polices pertaining to training and procedures to reduce contact transmission and when reuse of the FFRs by employees are allowed.]*** Disposable filtering facepiece respirators that will be reused in patient care areas should be stored in a breathable container such as a paper bag labeled with the user's name, as per your program policy **{_____}** ***[e.g., in the patient's room, etc.]***

Reusable elastomeric respirators that are assigned to individual users will be cleaned and disinfected/sterilized after use and stored at room temperature in a dry area that is protected from exposure to hazardous contaminants in **{_____}** ***[e.g., employee locker, nurses' station, etc.]*** as per the manufacturer's instructions. ***[The respirator has to be kept in a clean environment where it will not be damaged or contaminated]***.

PAPRs will be cleaned and stored after use **{_____}** ***[e.g., in Central Supply, at the nurses' station, etc.]*** and will be provided **{to employees upon request for use during aerosol-generating procedures being conducted on patients with suspected or confirmed airborne infectious disease or}** for use by individuals who are unable to wear a respirator with a tight-fitting facepiece. PAPRs must be stored at room temperature in a dry area that is protected from exposure to hazardous contaminants as per the manufacturer's instructions ***[Edit this section to describe when PAPRs will be provided in your facility.]***

8.2 Inspection, Maintenance and Repairs

All respirators will be inspected by the user prior to each use. Inspections should include a check of:

- Condition of the various parts including, but not limited to, the facepiece, head straps, valves, and cartridges, canisters, or filters.
- All rubber or plastic parts, for pliability and signs of deterioration.
- PAPR connecting tubes or hoses, air flow, and batteries.

Any defective respirators shall be removed from service. Defective disposable respirators will be discarded and replaced. Defective reusable respirators will be turned in to **{XXXXXX}** ***[specify who]*** for repair, adjustment, or disposal.

{XXXXXX} ***[specify who]*** is responsible for charging and maintaining PAPR pumps, filters, and batteries when they are stored or not in use.

Filters on reusable particulate respirators will be changed by the wearer whenever it becomes difficult to breathe. ***[Note: If you include the use of respirators with chemical cartridges in this RPP, you will need to add language about the schedule for changing cartridges and process of removal, cleaning/disinfection/sterilization, and storage.]***

For respirators maintained for emergency use, {XXXXXXX} [specify who] must:

- ***Keep respirators accessible to the work area.***
- ***Store respirators in such a manner as to be clearly marked for emergency use.***
- ***Store respirators in accordance with any applicable manufacturer instructions.***
- ***Inspect respirators at least monthly and in accordance with the manufacturer's recommendations.***
- ***Check for proper function before and after each use.***
- ***Certify the respirator with documentation of date of inspection, inspector name/signature, findings, remedial action taken if necessary, and serial number.***
- ***Provide certification information on a tag or label kept with the respirator or included in inspection reports stored as paper or electronic files.***

8.3 Cleaning and Disinfection

Reusable respirators will be cleaned with mild soap and warm water and air dried before storing in a plastic bag for reuse, as described in Appendix F of this RPP (which is mandatory Appendix B-2 of the Respiratory Protection standard ***[Note: If the manufacturer of your PAPRs has additional instructions for cleaning/disinfection/sterilization procedures, you should also include them here]***.

Reusable respirators issued for the exclusive use of an employee will be cleaned and disinfected **{by the user}** ***[change this if your facility has a procedure for centralized respirator cleaning]*** as often as necessary to maintain a sanitary condition.

Reusable respirators used in fit testing and training will be cleaned and disinfected after each use.

9.0 Program Evaluation

The RPA will conduct a periodic evaluation of the RPP to ensure that all aspects of the program meet the requirements of the OSHA Respiratory Protection standard and that the RPP is being implemented effectively to protect employees from respiratory hazards. This evaluation will be done **{_____}** ***[How often? Some recommend at least annually, but the requirement is "as necessary." State your procedure here.]***

Program evaluation will include, but is not limited to: ***[Program evaluation is required by the standard, but there are no rules regarding how you will evaluate, so you may choose alternatives to what is described below.]***

- A review of the written program.
- Completion of a program evaluation checklist based on observations of workplace practices.
- A review of feedback obtained from employees (to include respirator fit, selection, use, and maintenance issues) that will be collected during the annual training session. ***[Add other program evaluation methods if used at your facility.]***

The RPP will be revised as necessary and records of revisions will be kept on file with the written program. Any procedural changes that are implemented as a result of program evaluation will be communicated to the employees and reinforced by their supervisors.

10.0 Recordkeeping

The RPA will ensure that the following records are maintained:

- Personnel medical records such as medical clearance to wear a respirator shall be retained by **{XXXXXXXXX}** ***[specify who and where stored]*** as part of a confidential medical record. Medical clearance records must be made available in accord with the OSHA Access to Employee Exposure and Medical Records standard (29 CFR 1910.1020), and maintained for a minimum of thirty (30) years after an employee's separation or termination.
- Documentation of training and fit testing will be kept by **{XXXXXXXXX}** ***[specify who and where stored]*** until the next training or fit test.
  A copy of this RPP and records of program evaluations and revisions shall be kept by **{XXXXXXXXX}** ***[specify who and where stored]*** and made available to all affected employees, their representatives, and representatives of OSHA upon request.

RPP Appendix A: Respirator Assignments by Task or Location

[Adapt as needed for tasks and exposures in your facility]

Task or Location	Potential Exposure	Respiratory Protection	Employees Included
Performing aerosol-generating procedures on patients suspected or confirmed with a disease requiring Airborne Precautions or present when such procedures are performed ***[see HICPAC 2007 or other public health guidance for lists of diseases]***, including: **{Sputum induction}** **{Bronchoscopy}** **{Aerosolized administration of medications}** **{Pulmonary function testing}** **{Other clinical procedures that may aerosolize infectious agents}** ***[Name them for your facility either here or in your infection control plan.]***	Infectious aerosols	N95 respirator or a more protective respirator (such as a PAPR) ***[Note: your facility may choose to specify PAPR use (more protective than an N95 respirator) for aerosol-generating procedures on a patient with a disease requiring Airborne Precautions]***	***[Specify type of personnel, e.g., by job title (all rows)]***
Performing aerosol-generating procedures on patients suspected or confirmed with influenza cases or present during such procedures.	Infectious aerosols	N95 respirator or a more protective respirator (such as a PAPR)	
Entry into airborne infection isolation room or other area occupied by patients suspected or confirmed with a disease requiring Airborne Precautions.	Infectious aerosols	N95 respirator or a more protective respirator (such as a PAPR)	
Performing, or present during, routine patient care and support operations on a patient suspected or confirmed with a disease requiring Airborne Precautions.	Infectious aerosols	N95 respirator or a more protective respirator (such as a PAPR)	
Cleaning/decontaminating an area occupied by a patient suspected or confirmed with a disease requiring Airborne Precautions, or cleaning/decontaminating such an area after a patient has left but before the space has been adequately ventilated.	Infectious aerosols	N95 respirator or a more protective respirator (such as a PAPR)	
Laboratory operations involving aerosol transmissible disease pathogens ***[see HICPAC 2007 or other public health guidance]*** for which the biosafety plan requires respiratory protection ***[List specific operations here and/or in your facility's biosafety plan]***	Infectious aerosols	As specified in biosafety plan	
[List any other exposures and job tasks for which your facility has determined the use of respiratory protection is required; you may go beyond OSHA requirements]	***[Specify]***	***[Specify according to your facility's policy]***	

RPP Appendix B: Information for Voluntary Users

Appendix D to Sec. 1910.134: (Mandatory) Information for Employees Using Respirators When Not Required Under the Standard

Respirators are an effective method of protection against designated hazards when properly selected and worn. Respirator use is encouraged even when exposures are below the exposure limit, to provide an additional level of comfort and protection for workers. However, if a respirator is used improperly or not kept clean, the respirator itself can become a hazard to the worker. Sometimes, workers may wear respirators to avoid exposures to hazards, even if the amount of hazardous substance does not exceed the limits set by OSHA standards. If your employer provides respirators for your voluntary use, or if you provide your own respirator, you need to take certain precautions to be sure that the respirator itself does not present a hazard.

You should do the following:

1. Read and heed all instructions provided by the manufacturer on use, maintenance, cleaning and care, and warnings regarding the respirator's limitations.

2. Choose respirators certified for use to protect against the contaminant of concern. NIOSH, the National Institute for Occupational Safety and Health of the U.S. Department of Health and Human Services, certifies respirators. A label or statement of certification should appear on the respirator or respirator packaging. It will tell you what the respirator is designed for and how much it will protect you.

3. Do not wear your respirator into atmospheres containing contaminants for which your respirator is not designated to protect against. For example, a respirator designed to filter dust particles will not protect you against gases, vapors or very small solid particles of fumes or smoke.

4. Keep track of your respirator so that you do not mistakenly use someone else's respirator.

RPP Appendix C: Medical Clearance Questionnaires

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

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

To the employee:

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

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

1. Today's date:
2. Your name:
3. Your age (to nearest year):
4. Sex (circle one): Male/Female
5. Your height: ft. in.
6. Your weight: lbs.
7. Your job title:
8. A phone number where you can be reached by the healthcare professional who reviews this questionnaire (include the Area Code):
9. The best time to phone you at this number:
10. Has your employer told you how to contact the healthcare professional who will review this questionnaire (circle one): Yes/No

11. Check the type of respirator you will use (you can check more than one category):

    a. ___ N, R, or P disposable respirator (filter-mask, non-cartridge type only).

    b. ___ Other type (for example, half- or full-facepiece type, powered-air purifying, supplied-air, self-contained breathing apparatus).

12. Have you worn a respirator (circle one): Yes/No If “yes,” what type(s):

Part A. Section 2. (Mandatory) Questions 1 through 9 below must be answered by every employee who has been selected to use any type of respirator (please circle "yes" or "no").

		YES	NO
1.	Do you *currently* smoke tobacco, or have you smoked tobacco in the last month?	☐	☐
2.	Have you *ever had* any of the following conditions?	☐	☐
a.	Seizures	☐	☐
b.	Diabetes (sugar disease)	☐	☐
c.	Allergic reactions that interfere with your breathing	☐	☐
d.	Claustrophobia (fear of closed-in places)	☐	☐
e.	Trouble smelling odors	☐	☐
3.	Have you *ever had* any of the following pulmonary or lung problems?	☐	☐
a.	Asbestosis	☐	☐
b.	Asthma	☐	☐
c.	Chronic bronchitis	☐	☐
d.	Emphysema	☐	☐
e.	Pneumonia	☐	☐
f.	Tuberculosis	☐	☐
g.	Silicosis	☐	☐
h.	Pneumothorax (collapsed lung)	☐	☐
i.	Lung cancer	☐	☐
j.	Broken ribs	☐	☐
k.	Any chest injuries or surgeries	☐	☐
l.	Any other lung problem that you've been told about	☐	☐
4.	Do you *currently* have any of the following symptoms of pulmonary or lung illness?	☐	☐
a.	Shortness of breath	☐	☐
b.	Shortness of breath when walking fast on level ground or walking up a slight hill or incline	☐	☐
c.	Shortness of breath when walking with other people at an ordinary pace on level ground	☐	☐
d.	Have to stop for breath when walking at your own pace on level ground	☐	☐
e.	Shortness of breath when washing or dressing yourself	☐	☐

	YES	NO
f. Shortness of breath that interferes with your job	☐	☐
g. Coughing that produces phlegm (thick sputum)	☐	☐
h. Coughing that wakes you early in the morning	☐	☐
i. Coughing that occurs mostly when you are lying down	☐	☐
j. Coughing up blood in the last month	☐	☐
k. Wheezing	☐	☐
l. Wheezing that interferes with your job	☐	☐
m. Chest pain when you breathe deeply	☐	☐
n. Any other symptoms that you think may be related to lung problems	☐	☐
5. Have you *ever had* any of the following cardiovascular or heart problems?		
a. Heart attack	☐	☐
b. Stroke	☐	☐
c. Angina	☐	☐
d. Heart failure	☐	☐
e. Swelling in your legs or feet (not caused by walking)	☐	☐
f. Heart arrhythmia (heart beating irregularly)	☐	☐
g. High blood pressure	☐	☐
h. Any other heart problem that you've been told about	☐	☐
6. Have you *ever had* any of the following cardiovascular or heart symptoms?	☐	☐
a. Frequent pain or tightness in your chest	☐	☐
b. Pain or tightness in your chest during physical activity	☐	☐
c. Pain or tightness in your chest that interferes with your job	☐	☐
d. In the past two years, have you noticed your heart skipping or missing a beat	☐	☐
e. Heartburn or indigestion that is not related to eating	☐	☐
f. Any other symptoms that you think may be related to heart or circulation problems	☐	☐
7. Do you *currently* take medication for any of the following problems?	☐	☐
a. Breathing or lung problems	☐	☐
b. Heart trouble	☐	☐

	YES	NO
c. Blood pressure	☐	☐
d. Seizures	☐	☐
8. If you've used a respirator, have you *ever had* any of the following problems? (If you've never used a respirator, check the following space and go to question 9. ☐)	☐	☐
a. Eye irritation	☐	☐
b. Skin allergies or rashes	☐	☐
c. Anxiety	☐	☐
d. General weakness or fatigue	☐	☐
e. Any other problem that interferes with your use of a respirator	☐	☐
9. Would you like to talk to the healthcare professional who will review this questionnaire about your answers to this questionnaire?	☐	☐

Questions 10 to 15 below must be answered by every employee who has been selected to use either a full-facepiece respirator or a self-contained breathing apparatus (SCBA). For employees who have been selected to use other types of respirators, answering these questions is voluntary.

10. Have you *ever* lost vision in either eye (temporarily or permanently)?	☐	☐
11. Do you *currently* have any of the following vision problems?	☐	☐
a. Wear contact lenses	☐	☐
b. Wear glasses	☐	☐
c. Color blind	☐	☐
d. Any other eye or vision problem	☐	☐
12. Have you *ever had* an injury to your ears, including a broken eardrum?	☐	☐
13. Do you *currently* have any of the following hearing problems?	☐	☐
a. Difficulty hearing	☐	☐
b. Wear a hearing aid	☐	☐
c. Any other hearing or ear problem	☐	☐
14. Have you *ever had* a back injury?	☐	☐
15. Do you *currently* have any of the following musculoskeletal problems?	☐	☐
a. Weakness in any of your arms, hands, legs, or feet	☐	☐
b. Back pain	☐	☐
c. Difficulty fully moving your arms and legs	☐	☐

	YES	NO
d. Pain and stiffness when you lean forward or backward at the waist	☐	☐
e. Difficulty fully moving your head up or down	☐	☐
f. Difficulty fully moving your head side to side	☐	☐
g. Difficulty bending at your knees	☐	☐
h. Difficulty squatting to the ground	☐	☐
i. Climbing a flight of stairs or a ladder carrying more than 25 lbs.	☐	☐
j. Any other muscle or skeletal problem that interferes with using a respirator	☐	☐

Part B. Any of the following questions, and other questions not listed, may be added to the questionnaire at the discretion of the healthcare professional who will review the questionnaire.

	YES	NO
1. In your present job, are you working at high altitudes (over 5,000 feet) or in a place that has lower than normal amounts of oxygen?	☐	☐
If "yes," do you have feelings of dizziness, shortness of breath, pounding in your chest, or other symptoms when you're working under these conditions?	☐	☐
2. At work or at home, have you ever been exposed to hazardous solvents, hazardous airborne chemicals (e.g., gases, fumes, or dust), or have you come into skin contact with hazardous chemicals?	☐	☐
If "yes," name the chemicals if you know them:_____, _____, _____.		
3. Have you ever worked with any of the materials, or under any of the conditions, listed below?		
a. Asbestos	☐	☐
b. Silica (e.g., in sandblasting)	☐	☐
c. Tungsten/cobalt (e.g., grinding or welding this material)	☐	☐
d. Beryllium	☐	☐
e. Aluminum	☐	☐
f. Coal (for example, mining)	☐	☐
g. Iron	☐	☐
h. Tin	☐	☐
i. Dusty environments	☐	☐
j. Any other hazardous exposures	☐	☐
If "yes," describe these exposures: _____		

	YES	NO
4. List any second jobs or side businesses you have:	☐	☐
5. List your previous occupations:	☐	☐
6. List your current and previous hobbies:	☐	☐
7. Have you been in the military services? If "yes," were you exposed to biological or chemical agents (either in training or combat)	☐	☐
8. Have you ever worked on a HAZMAT team?	☐	☐
9. Other than medications for breathing and lung problems, heart trouble, blood pressure, and seizures mentioned earlier in this questionnaire, are you taking any other medications for any reason (including over-the-counter medications)? If "yes," name the medications if you know them: _____	☐	☐
10. Will you be using any of the following items with your respirator(s)?	☐	☐
a. HEPA Filters	☐	☐
b. Canisters (for example, gas masks)	☐	☐
c. Cartridges	☐	☐
11. How often are you expected to use the respirator(s) (circle "yes" or "no" for all answers that apply to you)?	☐	☐
a. Escape only (no rescue)	☐	☐
b. Emergency rescue only	☐	☐
c. Less than 5 hours per week	☐	☐
d. Less than 2 hours per day	☐	☐
e. 2 to 4 hours per day	☐	☐
f. Over 4 hours per day	☐	☐
12. During the period you are using the respirator(s), is your work effort:	☐	☐
a. *Light* (less than 200 kcal per hour) If "yes," how long does this period last during the average shift: ___ hrs. ___ mins. Examples of a light work effort are sitting while writing, typing, drafting, or performing light assembly work; or standing while operating a drill press (1-3 lbs.) or controlling machines.	☐	☐
b. Moderate (200 to 350 kcal per hour) If "yes," how long does this period last during the average shift: ___ hrs. ___ mins. Examples of moderate work effort are sitting while nailing or filing; driving a truck or bus in urban traffic; standing while drilling, nailing, performing assembly work, or transferring a moderate load (about 35 lbs.) at trunk level; walking on a level surface about 2 mph or down a 5-degree grade about 3 mph; or pushing a wheelbarrow with a heavy load (about 100 lbs.) on a level surface.	☐	☐

	YES	NO
c. Heavy (above 350 kcal per hour) If "yes," how long does this period last during the average shift: ___ hrs. ___ mins. Examples of heavy work are lifting a heavy load (about 50 lbs.) from the floor to your waist or shoulder; working on a loading dock; shoveling; standing while bricklaying or chipping castings; walking up an 8-degree grade about 2 mph; climbing stairs with a heavy load (about 50 lbs.).	☐	☐
13. Will you be wearing protective clothing and/or equipment (other than the respirator) when you're using the respirator? If "yes," describe this protective clothing and/or equipment:	☐	☐
14. Will you be working under hot conditions (temperature exceeding 77 deg. F)?	☐	☐
15. Will you be working under humid conditions?	☐	☐

16. Describe the work you'll be doing while you're using your respirator(s):

17. Describe any special or hazardous conditions you might encounter when you're using your respirator(s) (for example, confined spaces, life-threatening gases):

18. Provide the following information, if you know it, for each toxic substance that you'll be exposed to when you're using your respirator(s):

    Name of first toxic substance:

    Estimated maximum exposure level per shift:

    Duration of exposure per shift:

    Name of second toxic substance:

    Estimated maximum exposure level per shift:

    Duration of exposure per shift:

    Name of third toxic substance:

    Estimated maximum exposure level per shift:

    Duration of exposure per shift:

    The name of any other toxic substances that you'll be exposed to while using your respirator:

19. Describe any special responsibilities you'll have while using your respirator(s) that may affect the safety and well-being of others (for example, rescue, security):

RPP Appendix D: Selected Fit Test Protocols

[The protocols for qualitative fit testing with saccharin and Bitrex®, and the quantitative fit testing using the ambient aerosol condensation nuclei counter (CNC) protocol are included. Edit this section to include the specific fit test protocols from Appendix A of the OSHA standard that will be used at your facility.]

Appendix A to Sec.1910.134: Fit Testing Procedures (Mandatory)

Part I. OSHA-Accepted Fit Test Protocols

A. Fit Testing Procedures--General Requirements.

The employer shall conduct fit testing using the following procedures. The requirements in this appendix apply to all OSHA-accepted fit test methods, both QLFT and QNFT.

1. The test subject shall be allowed to pick the most acceptable respirator from a sufficient number of respirator models and sizes so that the respirator is acceptable to, and correctly fits, the user.

2. Prior to the selection process, the test subject shall be shown how to put on a respirator, how it should be positioned on the face, how to set strap tension and how to determine an acceptable fit. A mirror shall be available to assist the subject in evaluating the fit and positioning of the respirator. This instruction may not constitute the subject's formal training on respirator use, because it is only a review.

3. The test subject shall be informed that he/she is being asked to select the respirator that provides the most acceptable fit. Each respirator represents a different size and shape, and if fitted and used properly, will provide adequate protection.

4. The test subject shall be instructed to hold each chosen facepiece up to the face and eliminate those that obviously do not give an acceptable fit.

5. The more acceptable facepieces are noted in case the one selected proves unacceptable; the most comfortable mask is donned and worn at least five minutes to assess comfort. Assistance in assessing comfort can be given by discussing the points in the following item A.6. If the test subject is not familiar with using a particular respirator, the test subject shall be directed to don the mask several times and to adjust the straps each time to become adept at setting proper tension on the straps.

6. Assessment of comfort shall include a review of the following points with the test subject and allowing the test subject adequate time to determine the comfort of the respirator.

(a) Position of the mask on the nose

(b) Room for eye protection

(c) Room to talk

(d) Position of mask on face and cheeks

7. The following criteria shall be used to help determine the adequacy of the respirator fit:

(a) Chin properly placed;

(b) Adequate strap tension, not overly tightened;

(c) Fit across nose bridge;

(d) Respirator of proper size to span distance from nose to chin;

(e) Tendency of respirator to slip;

(f) Self-observation in mirror to evaluate fit and respirator position.

8. The test subject shall conduct a user seal check, either the negative and positive pressure seal checks described in Appendix B-1 or those recommended by the respirator manufacturer which provide equivalent protection to the procedures in Appendix B-1. Before conducting the negative and positive pressure checks, the subject shall be told to seat the mask on the face by moving the head from side-to-side and up and down slowly while taking in a few slow deep breaths. Another facepiece shall be selected and retested if the test subject fails the user seal check tests.

9. The test shall not be conducted if there is any hair growth between the skin and the facepiece sealing surface, such as stubble beard growth, beard, mustache or sideburns which cross the respirator sealing surface. Any type of apparel which interferes with a satisfactory fit shall be altered or removed.

10. If a test subject exhibits difficulty in breathing during the tests, she or he shall be referred to a physician or other licensed health care professional, as appropriate, to determine whether the test subject can wear a respirator while performing her or his duties.

11. If the employee finds the fit of the respirator unacceptable, the test subject shall be given the opportunity to select a different respirator and to be retested.

12. Exercise regimen. Prior to the commencement of the fit test, the test subject shall be given a description of the fit test and the test subject's responsibilities during the test procedure. The description of the process shall include a description of the test exercises that the subject will be performing. The respirator to be tested shall be worn for at least 5 minutes before the start of the fit test.

13. The fit test shall be performed while the test subject is wearing any applicable safety equipment that may be worn during actual respirator use which would interfere with respirator fit.

14. Test Exercises.

(a) Employers must perform the following test exercises for all fit testing methods prescribed in this appendix, except for the CNP quantitative fit testing protocol and the CNP REDON quantitative fit testing protocol. For these two protocols, employers must ensure that the test subjects (i.e., employees) perform the exercise procedure specified in Part I.C.4(b) of this appendix for the CNP quantitative fit testing protocol, or the exercise procedure described in Part I.C.(b) of this appendix for the CNP REDON quantitative fit-testing protocol. For the remaining fit testing methods, employers must ensure that employees perform the test exercises in the appropriate test environment in the following manner:

(1) Normal breathing. In a normal standing position, without talking, the subject shall breathe normally.

(2) Deep breathing. In a normal standing position, the subject shall breathe slowly and deeply, taking caution so as not to hyperventilate.

(3) Turning head side to side. Standing in place, the subject shall slowly turn his/her head from side to side between the extreme positions on each side. The head shall be held at each extreme momentarily so the subject can inhale at each side.

(4) Moving head up and down. Standing in place, the subject shall slowly move his/her head up and down. The subject shall be instructed to inhale in the up position (i.e., when looking toward the ceiling).

(5) Talking. The subject shall talk out loud slowly and loud enough so as to be heard clearly by the test conductor. The subject can read from a prepared text such as the Rainbow Passage, count backward from 100, or recite a memorized poem or song.

Rainbow Passage

When the sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long round arch, with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond reach, his friends say he is looking for the pot of gold at the end of the rainbow.

(6) Grimace. The test subject shall grimace by smiling or frowning. (This applies only to QNFT testing; it is not performed for QLFT.)

(7) Bending over. The test subject shall bend at the waist as if he/she were to touch his/her toes. Jogging in place shall be substituted for this exercise in those test environments such as shroud type QNFT or QLFT units that do not permit bending over at the waist.

(8) Normal breathing. Same as exercise (1).

(b) Each test exercise shall be performed for one minute except for the grimace exercise which shall be performed for 15 seconds. The test subject shall be questioned by the test conductor regarding the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another model of respirator shall be tried. The respirator shall not be adjusted once the fit test exercises begin. Any adjustment voids the test, and the fit test must be repeated.

B. Qualitative Fit Test (QLFT) Protocols

1. General

(a) The employer shall ensure that persons administering QLFT are able to prepare test solutions, calibrate equipment and perform tests properly, recognize invalid tests, and ensure that test equipment is in proper working order.

(b) The employer shall ensure that QLFT equipment is kept clean and well maintained so as to operate within the parameters for which it was designed.

2. Isomayl Acetate Protocol (omitted - rarely used)

3. Irritant Smoke (omitted - rarely used)

4. Saccharin Solution Aerosol Protocol

The entire screening and testing procedure shall be explained to the test subject prior to conducting the screening test.

(a) Taste threshold screening. The saccharin taste threshold screening, performed without wearing a respirator, is intended to determine whether the individual being tested can detect the taste of saccharin.

(1) During threshold screening as well as during fit testing, subjects shall wear an enclosure about the head and shoulders that is approximately 12 inches in diameter by 14 inches tall with at least the front portion clear and that allows free movements of the head when a respirator is worn. An enclosure substantially similar to the 3M hood assembly, parts # FT 14 and # FT 15 combined, is adequate.

(2) The test enclosure shall have a 3/4-inch (1.9 cm) hole in front of the test subject's nose and mouth area to accommodate the nebulizer nozzle.

(3) The test subject shall don the test enclosure. Throughout the threshold screening test, the test subject shall breathe through his/her slightly open mouth with tongue extended. The subject is instructed to report when he/she detects a sweet taste.

(4) Using a DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent, the test conductor shall spray the threshold check solution into the enclosure. The nozzle is directed away from the nose and mouth of the person. This nebulizer shall be clearly marked to distinguish it from the fit test solution nebulizer.

(5) The threshold check solution is prepared by dissolving 0.83 gram of sodium saccharin USP in 100 ml of warm water. It can be prepared by putting 1 ml of the fit test solution (see (b)(5) below) in 100 ml of distilled water.

(6) To produce the aerosol, the nebulizer bulb is firmly squeezed so that it collapses completely, then released and allowed to fully expand.

(7) Ten squeezes are repeated rapidly and then the test subject is asked whether the saccharin can be tasted. If the test subject reports tasting the sweet taste during the ten squeezes, the screening test is completed. The taste threshold is noted as ten regardless of the number of squeezes actually completed.

(8) If the first response is negative, ten more squeezes are repeated rapidly and the test subject is again asked whether the saccharin is tasted. If the test subject reports tasting the sweet taste during the second ten squeezes, the screening test is completed. The taste threshold is noted as twenty regardless of the number of squeezes actually completed.

(9) If the second response is negative, ten more squeezes are repeated rapidly and the test subject is again asked whether the saccharin is tasted. If the test subject reports tasting the sweet taste during the third set of ten squeezes, the screening test is completed. The taste threshold is noted as thirty regardless of the number of squeezes actually completed.

(10) The test conductor will take note of the number of squeezes required to solicit a taste response.

(11) If the saccharin is not tasted after 30 squeezes (step 10), the test subject is unable to taste saccharin and may not perform the saccharin fit test.

Note to subsection 3. (a): If the test subject eats or drinks something sweet before the screening test, he/she may be unable to taste the weak saccharin solution.

(12) If a taste response is elicited, the test subject shall be asked to take note of the taste for reference in the fit test.

(13) Correct use of the nebulizer means that approximately 1 ml of liquid is used at a time in the nebulizer body.

(14) The nebulizer shall get thoroughly rinsed in water, shaken dry, and refilled at least each morning and afternoon or at least every four hours.

(b) Saccharin solution aerosol fit test procedure.

(1) The test subject may not eat, drink (except for plain water), smoke, or chew gum for 15 minutes before the test.

(2) The fit test uses the same enclosure described in 3.(a) above.

(3) The test subject shall don the enclosure while wearing the respirator selected in section I.A. of this appendix. The respirator shall be properly adjusted and equipped with a particulate filter(s).

(4) A second DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent is used to spray the fit test solution into the enclosure. This nebulizer shall be clearly marked to distinguish it from the screening test solution nebulizer.

(5) The fit test solution is prepared by adding 83 grams of sodium saccharin to 100 ml of warm water.

(6) As before, the test subject shall breathe through the slightly open mouth with tongue extended, and report if he/she tastes the sweet taste of saccharin.

(7) The nebulizer is inserted into the hole in the front of the enclosure and an initial concentration of saccharin fit test solution is sprayed into the enclosure using the same number of squeezes (either 10, 20 or 30 squeezes) based on the number of squeezes required to elicit a taste response as noted during the screening test. A minimum of 10 squeezes is required.

(8) After generating the aerosol, the test subject shall be instructed to perform the exercises in section I.A.14. of this appendix.

(9) Every 30 seconds the aerosol concentration shall be replenished using one half the original number of squeezes used initially (e.g., 5, 10, or 15).

(10) The test subject shall indicate to the test conductor if at any time during the fit test the taste of saccharin is detected. If the test subject does not report tasting the saccharin, the test is passed.

(11) If the taste of saccharin is detected, the fit is deemed unsatisfactory and the test is failed. A different respirator shall be tried and the entire test procedure is repeated (taste threshold screening and fit testing).

(12) Since the nebulizer has a tendency to clog during use, the test operator must make periodic checks of the nebulizer to ensure that it is not clogged. If clogging is found at the end of the test session, the test is invalid.

5. Bitrex® (Denatonium Benzoate) Solution Aerosol Qualitative Fit Test Protocol.

The Bitrex® (Denatonium benzoate) solution aerosol QLFT protocol uses the published saccharin test protocol because that protocol is widely accepted. Bitrex® is routinely used as a taste aversion agent in household liquids which children should not be drinking and is endorsed by the American Medical Association, the National Safety Council, and the American Association of Poison Control Centers. The entire screening and testing procedure shall be explained to the test subject prior to the conduct of the screening test.

(a) Taste Threshold Screening.

The Bitrex® taste threshold screening, performed without wearing a respirator, is intended to determine whether the individual being tested can detect the taste of Bitrex.

(1) During threshold screening as well as during fit testing, subjects shall wear an enclosure about the head and shoulders that is approximately 12 inches (30.5 cm) in diameter by 14 inches (35.6 cm) tall. The front portion of the enclosure shall be clear from the respirator and allow free movement of the head when a respirator is worn. An enclosure substantially similar to the 3M hood assembly, parts #14 and #15 combined, is adequate.

(2) The test enclosure shall have a 3/4 inch (1.9 cm) hole in front of the test subject's nose and mouth area to accommodate the nebulizer nozzle.

(3) The test subject shall don the test enclosure. Throughout the threshold screening test, the test subject shall breathe through his or her slightly open mouth with tongue extended. The subject is instructed to report when he/she detects a bitter taste.

(4) Using a DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent, the test conductor shall spray the Threshold Check Solution into the enclosure. This nebulizer shall be clearly marked to distinguish it from the fit test solution nebulizer.

(5) The Threshold Check Solution is prepared by adding 13.5 milligrams of Bitrex® to 100 ml of 5% salt (NaCl) solution in distilled water.

(6) To produce the aerosol, the nebulizer bulb is firmly squeezed so that the bulb collapses completely, and is then released and allowed to fully expand.

(7) An initial ten squeezes are repeated rapidly and then the test subject is asked whether the Bitrex® can be tasted. If the test subject reports tasting the bitter taste during the ten squeezes, the screening test is completed. The taste threshold is noted as ten regardless of the number of squeezes actually completed.

(8) If the first response is negative, ten more squeezes are repeated rapidly and the test subject is again asked whether the Bitrex® is tasted. If the test subject reports tasting the bitter taste during the second ten squeezes, the screening test is completed. The taste threshold is noted as twenty regardless of the number of squeezes actually completed.

(9) If the second response is negative, ten more squeezes are repeated rapidly and the test subject is again asked whether the Bitrex® is tasted. If the test subject reports tasting the bitter taste during the third set of ten squeezes, the screening test is completed. The taste threshold is noted as thirty regardless of the number of squeezes actually completed.

(10) The test conductor will take note of the number of squeezes required to solicit a taste response.

(11) If the Bitrex® is not tasted after 30 squeezes (step 10), the test subject is unable to taste Bitrex® and may not perform the Bitrex® fit test.

(12) If a taste response is elicited, the test subject shall be asked to take note of the taste for reference in the fit test.

(13) Correct use of the nebulizer means that approximately 1 ml of liquid is used at a time in the nebulizer body.

(14) The nebulizer shall be thoroughly rinsed in water, shaken to dry, and refilled at least each morning and afternoon or at least every four hours.

(b) Bitrex® Solution Aerosol Fit Test Procedure.

(1) The test subject may not eat, drink (except plain water), smoke, or chew gum for 15 minutes before the test.

(2) The fit test uses the same enclosure as that described in 4.(a) above.

(3) The test subject shall don the enclosure while wearing the respirator selected according to section I.A. of this appendix. The respirator shall be properly adjusted and equipped with any type particulate filter(s).

(4) A second DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent is used to spray the fit test solution into the enclosure. This nebulizer shall be clearly marked to distinguish it from the screening test solution nebulizer.

(5) The fit test solution is prepared by adding 337.5 mg of Bitrex® to 200 ml of a 5% salt (NaCl) solution in warm water.

(6) As before, the test subject shall breathe through his or her slightly open mouth with tongue extended, and be instructed to report if he/she tastes the bitter taste of Bitrex.

(7) The nebulizer is inserted into the hole in the front of the enclosure and an initial concentration of the fit test solution is sprayed into the enclosure using the same number of squeezes (either 10, 20 or 30 squeezes) based on the number of squeezes required to elicit a taste response as noted during the screening test.

(8) After generating the aerosol, the test subject shall be instructed to perform the exercises in section I.A.14. of this appendix.

(9) Every 30 seconds the aerosol concentration shall be replenished using one half the number of squeezes used initially (e.g., 5, 10 or 15).

(10) The test subject shall indicate to the test conductor if at any time during the fit test the taste of Bitrex® is detected. If the test subject does not report tasting the Bitrex, the test is passed.

(11) If the taste of Bitrex® is detected, the fit is deemed unsatisfactory and the test is failed. A different respirator shall be tried and the entire test procedure is repeated (taste threshold screening and fit testing).

C. Quantitative Protocols (QNFT)

1. General

(a) The employer shall ensure that persons administering QNFT are able to calibrate equipment and perform tests properly, recognize invalid tests, calculate fit factors properly and ensure that test equipment is in proper working order.

(b) The employer shall ensure that QNFT equipment is kept clean, and is maintained and calibrated according to the manufacturer's instructions so as to operate at the parameters for which it was designed.

2. Generated Aerosol Quantitative Fit Testing Protocol (omitted-not used)

3. Ambient Aerosol Condensation Nuclei Counter (CNC) Quantitative Fit Testing Protocol

(a) Portacount Fit Test Requirements.

(1) Check the respirator to make sure the sampling probe and line are properly attached to the facepiece and that the respirator is fitted with a particulate filter capable of preventing significant penetration by the ambient particles used for the fit test (e.g., NIOSH 42 CFR 84 series 100, series 99, or series 95 particulate filter) as per the manufacturer's instruction.

(2) Instruct the person to be tested to don the respirator for five minutes before the fit test starts. This purges the ambient particles trapped inside the respirator and permits the wearer to make certain the respirator is comfortable. This individual shall already have been trained on how to wear the respirator properly.

(3) Check the following conditions for the adequacy of the respirator fit: Chin properly placed; Adequate strap tension, not overly tightened; Fit across nose bridge; Respirator of proper size to span distance from nose to chin; Tendency of the respirator to slip; Self-observation in a mirror to evaluate fit and respirator position.

(4) Have the person wearing the respirator do a user seal check. If leakage is detected, determine the cause. If leakage is from a poorly fitting facepiece, try another size of the same model respirator, or another model of respirator.

(5) Follow the manufacturer's instructions for operating the Portacount and proceed with the test.

(6) The test subject shall be instructed to perform the exercises in section I. A. 14. of this appendix.

(7) After the test exercises, the test subject shall be questioned by the test conductor regarding the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another model of respirator shall be tried.

(b) Portacount Test Instrument.

(1) The Portacount will automatically stop and calculate the overall fit factor for the entire set of exercises. The overall fit factor is what counts. The Pass or Fail message will indicate whether or not the test was successful. If the test was a Pass, the fit test is over.

(2) Since the pass or fail criterion of the Portacount is user programmable, the test operator shall ensure that the pass or fail criterion meet the requirements for minimum respirator performance in this Appendix.

(3) A record of the test needs to be kept on file, assuming the fit test was successful. The record must contain the test subject's name; overall fit factor; make, model, style, and size of respirator used; and date tested.

4. Controlled Negative Pressure (CNP) Quantitative Fit Test Protocol - (omitted - not used)

5. Controlled Negative Pressure (CNP) REDON Quantitative Fit Testing Protocol - (omitted - not used)

RPP Appendix E: User Seal Check Procedures

Appendix B-1. to Sec. 1910.134: User Seal Check Procedures (Mandatory)

The individual who uses a tight-fitting respirator is to perform a user seal check to ensure that an adequate seal is achieved each time the respirator is put on. Either the positive and negative pressure checks listed in this appendix, or the respirator manufacturer's recommended user seal check method shall be used. User seal checks are not substitutes for qualitative or quantitative fit tests.

I. Facepiece Positive and/or Negative Pressure Checks.

A. Positive pressure check. Close off the exhalation valve and exhale gently into the facepiece. The face fit is considered satisfactory if a slight positive pressure can be built up inside the facepiece without any evidence of outward leakage of air at the seal. For most respirators this method of leak testing requires the wearer to first remove the exhalation valve cover before closing off the exhalation valve and then carefully replacing it after the test.

B. Negative pressure check. Close off the inlet opening of the canister or cartridge(s) by covering with the palm of the hand(s) or by replacing the filter seal(s), inhale gently so that the facepiece collapses slightly, and hold the breath for ten seconds. The design of the inlet opening of some cartridges cannot be effectively covered with the palm of the hand. The test can be performed by covering the inlet opening of the cartridge with a thin latex or nitrile glove. If the facepiece remains in its slightly collapsed condition and no inward leakage of air is detected, the tightness of the respirator is considered satisfactory.

II. Manufacturer's Recommended User Seal Check Procedures.

The respirator manufacturer's recommended procedures for performing a user seal check may be used instead of the positive and/or negative pressure check procedures provided that the employer demonstrates that the manufacturer's procedures are equally effective.

RPP Appendix F: Respirator Cleaning Procedures

Appendix B-2. to Sec. 1910.134: Respirator Cleaning Procedures (Mandatory)

These procedures are provided for employer use when cleaning respirators. They are general in nature, and the employer as an alternative may use the cleaning recommendations provided by the manufacturer of the respirators used by their employees, provided such procedures are as effective as those listed here in Appendix B-2. Equivalent effectiveness simply means that the procedures used must accomplish the objectives set forth in Appendix B-2, i.e., must ensure that the respirator is properly cleaned and disinfected in a manner that prevents damage to the respirator and does not cause harm to the user.

I. Procedures for Cleaning Respirators.

A. Remove filters, cartridges, or canisters. Disassemble facepieces by removing speaking diaphragms, demand and pressure-demand valve assemblies, hoses, or any components recommended by the manufacturer. Discard or repair any defective parts.

B. Wash components in warm (43 deg. C [110 deg. F] maximum) water with a mild detergent or with a cleaner recommended by the manufacturer. A stiff bristle (not wire) brush may be used to facilitate the removal of dirt.

C. Rinse components thoroughly in clean, warm (43 deg. C [110 deg. F] maximum), preferably running water. Drain.

D. When the cleaner used does not contain a disinfecting agent, respirator components should be immersed for two minutes in one of the following:

1. Hypochlorite solution (50 ppm of chlorine) made by adding approximately one milliliter of laundry bleach to one liter of water at 43 deg. C (110 deg. F); or,

2. Aqueous solution of iodine (50 ppm iodine) made by adding approximately 0.8 milliliters of tincture of iodine (6-8 grams ammonium and/or potassium iodide/100 cc of 45% alcohol) to one liter of water at 43 deg. C (110 deg. F); or,

3. Other commercially available cleansers of equivalent disinfectant quality when used as directed, if their use is recommended or approved by the respirator manufacturer.

E. Rinse components thoroughly in clean, warm (43 deg. C [110 deg. F] maximum), preferably running water. Drain. The importance of thorough rinsing cannot be overemphasized. Detergents or disinfectants that dry on facepieces may result in dermatitis. In addition, some disinfectants may cause deterioration of rubber or corrosion of metal parts if not completely removed.

F. Components should be hand-dried with a clean lint-free cloth or air-dried.

G. Reassemble facepiece, replacing filters, cartridges, and canisters where necessary.

H. Test the respirator to ensure that all components work properly.

For More Information

Contacting NIOSH

To ask questions regarding the content of this document or for more information about occupational safety and health topics, please contact NIOSH: 1-800-CDC-INFO (1-800-232-4636); TTY: 1-888-232-6348; e-mail: cdcinfo@cdc.gov or visit the NIOSH website at www.cdc.gov/niosh.

Contacting OSHA

To ask questions or to get more information about OSHA regulations, or to file a confidential complaint, contact OSHA at 1-800-321-OSHA (6742) or TTY: 1-877-889-5627 or go to www.osha.gov.

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U.S. Department of Labor

Occupational Safety and Health Administration

Workplace Safety and Health

National Institute for Occupational Safety and Health

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