Implementing Hospital Respiratory Protection Programs: Strategies from the Field

The Joint Commission®

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Disclaimer

This monograph was developed by The Joint Commission under a project supported in part by the National Institute for Occupational Safety and Health (NIOSH), under contract no. 254-2011-M-41082. This educational monograph is intended to stimulate greater awareness and knowledge of the importance of effective respiratory protection programs in hospitals, as well as to provide examples of strategies for overcoming common implementation challenges. The views expressed in written materials and by speakers do not necessarily reflect the official policies of NIOSH; nor does mention of trade names, commercial practices, or organizations imply endorsement by the U.S. government.

This monograph is designed to introduce concepts and topics but is not intended to be a comprehensive source of all relevant information relating to respiratory protection programs in healthcare settings. The monograph is not designed to provide guidance on compliance with OSHA regulations, state legislative requirements, or Joint Commission standards. Readers should refer to the source documents listing requirements from the respective organizations for guidance on compliance issues. Similarly, recommendations for practice described herein should not be construed as policy or practice recommendations from The Joint Commission or NIOSH.

Many of the examples in this monograph come from self-reported methods, tools, and data submitted by healthcare organizations in response to The Joint Commission's call for practices (see 1.4); thus, the information is not necessarily evidence-based. Although some suggestions and recommendations are derived from literature, a systematic literature review was not performed. In addition, practices that are referenced in the text should not be considered evidence-based because of the limited amount of rigorous research in this area.

The content and recommendations are solely the responsibility of the Joint Commission project staff and others who contributed material. We have worked to ensure that this monograph contains useful information; however, because the information contained herein is derived from many sources, The Joint Commission cannot guarantee that the information is completely accurate or error free. The Joint Commission is not responsible for any claims or losses arising from the use of, or from any errors or omissions in, this monograph.

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Conflict of Interest

All of the technical expert panel members signed conflict of interest attestations. None of the panel members reported any affiliations or financial involvements that conflict with the material presented in this monograph.

Chapter 1: Introduction and Overview of Methodology

Increasing evidence suggests that healthcare is a high-hazard industry and that healthcare workers face a variety of potential dangers on the job.[1,2] One often-overlooked danger is exposure to various types of respiratory hazards. To protect their workers and the patients they serve, hospitals and other healthcare organizations have established respiratory protection programs (RPPs). In any workplace where respiratory protection serves as a method for controlling employee exposure to airborne hazards, these comprehensive programs are required by law according to the 1998 Occupational Safety and Health Administration (OSHA) standard on Respiratory Protection (29 CFR 1910.134).[3] The programs must be overseen by a designated respiratory protection program administrator (RPP administrator).

A respiratory protection program is a cohesive set of worksite-specific procedures and policies that, when implemented, addresses the following required elements:[4]

- Annual training of employees in why a respirator is necessary (e.g., the respiratory hazards to which they are potentially exposed during routine and emergency situations); and proper use of respirators, limitations on their use, and their maintenance
- Procedures for selecting appropriate respirators for use in the workplace
- Fit testing for tight fitting respirators (at initial hire and annually thereafter)
- Cleaning, disinfecting, storing, inspecting, repairing, and removing from service or discarding respirators (including established schedules for each of these elements)
- Ensuring adequate supply, quantity, and flow of breathing air for atmosphere-supplying respirators
- Provisions for medical evaluation of employees who must wear respirators
- Maintaining records of medical evaluation, fit testing, etc.
- Regular evaluation of the effectiveness of the program

In recent years there has been a renewed focus in healthcare on the appropriate use of respiratory protection.[5] This attention is driven in part by increased awareness of the risk of known hazards, such as the emergence of multidrug-resistant tuberculosis (MDR-TB); exposure to certain disinfectants (e.g. glutaraldehyde); antineoplastic drugs; surgical smoke; and chemical, biological, and radiological hazards addressed through emergency preparedness training. This awareness also extends to anticipated new risks which have captured the attention of policymakers as well as workers. Healthcare organizations must be prepared for the next Severe Acute Respiratory Syndrome (SARS)–like outbreak of unknown or novel etiology, as well as the ever-present possibility of pandemic influenza.[6]

While certain staff may be at higher risk for exposure to respiratory hazards based on their job (for instance, employees performing aerosol-generating procedures or laboratory personnel processing respiratory tract specimens from patients affected by an outbreak), all staff must be confident that their respiratory health is adequately protected. Protection is enhanced through a range of control measures, including elimination, substitution, engineering, administrative, and personal protective equipment controls[7] that should be addressed in a comprehensive respiratory protection program. Nevertheless, implementing a comprehensive respiratory protection program can be challenging, as was evident during the 2009 H1N1 outbreak (described later in this chapter).

1.1 Purpose of Monograph

This educational monograph is intended to stimulate greater awareness and knowledge of the importance of effective respiratory protection programs in hospitals as well as to provide examples of strategies for overcoming common implementation challenges. The Joint Commission developed this monograph through a research contract with the Centers for Disease Control and Prevention (CDC), National Institute for

Occupational Safety and Health (NIOSH), National Personal Protective Technology Laboratory (NPPTL) (Contract # 254-2011-M-41082). The Joint Commission has also developed several other educational monographs on infection prevention and the intersection between healthcare worker safety and patient safety, all of which are available at http://www.jointcommission.org/health_services_research.aspx.

This monograph is not intended to provide guidance on compliance with federal OSHA or state regulatory requirements. However, the examples provided in the monograph are derived from these requirements. For guidance on compliance issues, readers should refer to the source documents detailing requirements from the respective agencies and organizations (see Appendix A: Resource Tables). The monograph does not specifically address compliance with Joint Commission standards used in the accreditation process. However, examples of relationships between Joint Commission standards and OSHA requirements are outlined in Chapter 2 and Appendix B.

1.2 Scope, Target Audience, and Limitations

Scope. The scope of this monograph covers ways that hospitals can build, implement, and maintain effective respiratory protection programs for the health and safety of their employees and patients. It is intended to be an educational document for RPP administrators and others who wish to learn about solutions to common problems associated with the implementation and management of a successful respiratory protection program. In addition, this monograph is intended to accomplish the following:

- Highlight examples from hospitals that have improved their programs through leadership involvement and promotion of a safety culture
- Describe common training and fit testing challenges and potential strategies for overcoming barriers
- Share practical approaches to promoting effective communication, coordination, and collaboration
- Highlight currently available educational resources

Target Audience. The target audience includes persons responsible for administering or implementing organization-wide respiratory protection programs in hospitals, such as occupational and employee health professionals, infection preventionists, respiratory department staff, environmental health staff, quality improvement professionals, safety personnel, emergency preparedness and response workers, risk managers, frontline staff, and administrative and clinical leaders.

The information provided in this monograph is relevant to a variety of inpatient settings. Although the practices and examples are primarily from acute care hospitals, specialty hospitals such as psychiatric, rehabilitation, and long-term acute care facilities should find certain concepts and ideas applicable to their institutions. In addition, the information may be meaningful to non-hospital facility-based settings (e.g., nursing homes and ambulatory care settings) as well as nonfacility-based settings (e.g., home care).

A glossary of terms is included following Chapter 4.

Limitations. It is important to note that the monograph is not intended to be a comprehensive source of information and resources for hospital respiratory protection programs. For example, technical information on respirator selection, fit testing, training, and OSHA requirements is specifically excluded in order to focus on improving the overall program at the organization level. Readers should refer to source documents and several excellent new resources and toolkits listed in Appendix A: Resource Tables for information on requirements and technical issues.

Finally, recommendations described herein should not be construed as policy or practice recommendations from The Joint Commission. The content and recommendations are solely the responsibility of The Joint Commission monograph project staff and others who contributed material. Many of the examples in this monograph come from self-reported methods, tools, and data submitted by healthcare organizations in response to The Joint Commission's call for practices; thus, the information is not necessarily evidence-based. Although some suggestions and recommendations are derived from literature, a systematic literature review was not performed. In addition, practices that are referenced in the text should not be considered evidence-based because

of the limited amount of rigorous research in this area. Nevertheless, the content has been carefully reviewed by both technical experts and practitioners and is considered to reflect the current state of knowledge in this area.

1.3 Related Studies and Initiatives

As part of a series of CDC NIOSH–sponsored initiatives designed to improve respiratory protection programs nationally, this monograph is intended to build upon the findings from prior public health practice research and evaluation initiatives described below.

REACH I and II Initiatives. The Respirator Evaluation in Acute Care Hospitals (REACH) I study evaluated the use of respiratory protection for influenza exposure among healthcare workers in 16 California hospitals during the H1N1 influenza outbreak of 2009–2010. Information was obtained from more than 200 healthcare workers using surveys, interviews, and on-site observations.[5] The workers represented a wide range of clinical specialties (including emergency care, critical care, and pediatrics) and roles such as unit managers, RPP administrators, and direct care providers.[8]

Findings from the REACH I study suggested that N95 filtering facepiece respirators (N95 respirators) were being used extensively in California, and nearly all interviewed healthcare workers stated they would wear an N95 respirator or higher level of protection if caring for a patient suspected of or with confirmed H1N1. However, the study noted gaps in written respiratory protection programs. Areas in need of improvement included recordkeeping, designation of an RPP administrator, program evaluation, training, and fit testing procedures.[5] In addition, improper donning (putting on) and doffing (removing) of the N95 respirator and failure to perform hand hygiene after removal was observed. Approximately 50% of hospital managers reported that their facility experienced a shortage of respirators between April 2009 and the survey period (January 20–February 23, 2010).[5]

Expanding upon REACH I, the REACH II study assessed hospitals' respiratory protection programs as well as healthcare workers' usage of respiratory protection for influenza and aerosol-transmissible disease exposures in five major regions of the United States, from 2011 to 2012.[8] REACH II identified the following areas of concern:

- While policies exist, the awareness of staff and consistency of implementation varies within and across hospitals.
- Most healthcare workers recall being fit tested when hired but do not recall many training updates.
- Healthcare workers are uncertain about when to use respiratory protection.
- Healthcare workers are uncertain about what type of respirator to use.
- Healthcare workers are unclear about how to properly don and doff respirators, including how to properly position straps, perform seal checks, or dispose of respirators upon removal.[9]

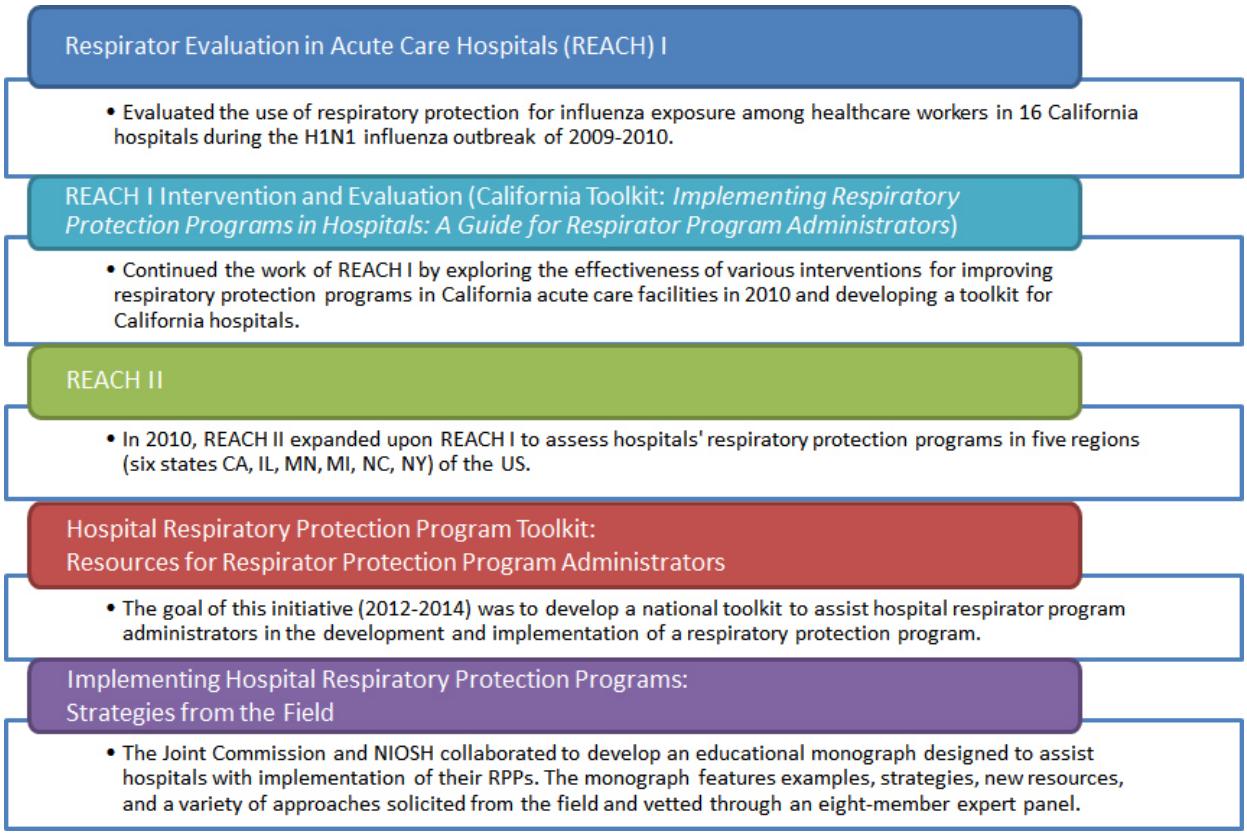
For more information on these studies, please go to http://www.cdc.gov/niosh/npptl/respusers.html.

Development of Publicly Available Toolkits for Respiratory Protection Programs. On August 5, 2009, California OSHA promulgated the Cal/OSHA Aerosol Transmissible Diseases (ATD) Standard (Title 8 CCR Section 5199). This standard requires the use of respiratory protection—in addition to other control measures—to protect certain workers performing specific tasks.[10]

To help California hospitals comply with the ATD standard, NIOSH/NPPTL supported a project to develop a California-specific guide, *Implementing Respiratory Protection Programs in Hospitals: A Guide for Respirator Program Administrators*, published in December 2011 (contract number 254-2010-345-11). This toolkit was designed to assist California hospital respirator program administrators—in particular, those without formal education in workplace health and safety—in the development and implementation of a respiratory protection program.[11]

Recognizing the need to have a similar toolkit consistent with the national OSHA standards and policies, NIOSH/NPPTL supported another initiative to adapt the California toolkit to a national audience. The *Hospital Respiratory Protection Program Toolkit: Resources for Respirator Program Administrators* (referred to as the National Toolkit) was developed under contract number

Figure 1-1: Related NIOSH Respiratory Protection Program Initiatives



254-2011-M-40839 from NIOSH/NPPTL. The National Toolkit references public health recommendations regarding respirator use for ATDs and provides descriptions of relevant mandatory safety and health standards. It is "advisory in nature, informational in content, and [is] intended to assist employers in providing a safe and healthful workplace."[12]

Figure 1-1 displays an overview of the initiatives described.

Examples of Additional NIOSH Research in Progress. NIOSH is engaged in efforts to address several additional issues in respiratory protection including work related to cough aerosols, and new respirator technologies. NIOSH recently surveyed healthcare workers about precautionary practices used to minimize exposures and barriers to using PPE for chemical hazards commonly found in healthcare settings. These included chemotherapy drugs (also known as antineoplastic drugs), aerosolized medications, chemical sterilants (e.g., ethylene oxide), high-level disinfectants, anesthetic gases, and surgical smoke.[13] An example of preliminary results related to the use of respiratory protection for surgical smoke that supports the need for greater attention to respiratory protection programs is provided in Sidebar 1-1, page 5.

1.4 Project Organization and Methodology

The content of this monograph derives from several sources, including expert guidance, an in-person NIOSH stakeholder meeting, and a national call for effective practices.

Technical Expert Panel. To guide monograph development, The Joint Commission convened an eight-member Technical Expert Panel (TEP) under the leadership of Scientific Advisor Robert Harrison, MD, MPH. Table 1-1, page 6, lists the members who were part of this panel.

Sidebar 1-1: Use of Exposure Controls for Surgical Smoke: Findings from the NIOSH Health and Safety Practices Survey of Healthcare Workers

Healthcare workers can protect themselves from exposure to airborne contaminants by using NIOSH–approved respirators, particularly when engineering controls and administrative controls are lacking or ineffective. Surgical smoke is an example of an air contaminant commonly found in operating rooms that incorporate laser and electrosurgical procedures. Various professional practice organizations and government agencies recommend using local exhaust ventilation (LEV) as a primary means to control surgical smoke. In its absence, where smoke plumes are produced, NIOSH–approved respirators should be used in accordance with a written respiratory protection program, as required by OSHA. Surgical smoke exposure control practices were characterized by NIOSH in a 2011 survey of healthcare workers representing 21 professional practice organizations.* Respondents primarily represented nurse anesthetists, anesthesiologists, perioperative and OR nurses, and surgical technologists. Specifically, use of controls such as LEV and respirators was assessed among survey respondents who responded "yes" to the following question: "At any time in the past 7 calendar days, did you work within 5 feet of the source of surgical smoke?" The proportion of hospital-based respondents reporting always using a respirator was 4% (n = 1,102) and 1% (n = 3,719) during laser and electrosurgical procedures, respectively. For laser surgery, 55% (n = 1,108) reported that LEV was sometimes/never used; for electrosurgery, an even greater percent reported not always using LEV: 86% (n = 3,752). Unexpectedly, those reporting not always using LEV were also less likely to report using a respirator ($p < 0.01$). The survey also found that surgical and laser masks, which are not respirators and do not provide respiratory protection, were used by a majority of respondents during both procedures. Lack of appropriate respiratory protection and LEV underscores a need for employer and worker education and training concerning appropriate exposure controls for surgical smoke.

* **Source:** Personal communication between Jim Boiano and Andrea Steege (NIOSH) and Barbara Braun and Hasina Hafiz on July 9, 2014.

NIOSH Stakeholder Workshop. Joint Commission project staff were invited to a breakout session at the March 2012 NIOSH National Personal Protective Technology Laboratory Program's Stakeholder Meeting and Workshop. The objectives of the interactive session were (1) to provide participants with an overview of the project, (2) to identify innovative strategies and practices within respiratory protection programs, and (3) to identify challenges associated with the implementation of respiratory protection programs. The intent was to use the information from the breakout sessions to inform the development of a questionnaire regarding hospital use and implementation of respiratory protection programs. In addition, the information gathered from the group was used to augment the development of the educational monograph.

Participants were gathered in four small groups and each group answered several questions related to respiratory protection programs in their organizations (see Sidebar 1-2, page 7). These questions, developed with input from the TEP prior to the meeting, were designed to engage the participants and encourage information sharing. The discussion was guided by a facilitator and recorded by a scribe. After the small group exercise, participants reconvened as a large group and responses were discussed and recorded by project staff. Responses focused primarily on the first two issues (strategies and challenges). The resulting information was used to guide the development of a call for practices questionnaire and to inform the content of the monograph. Identified approaches and barriers were later reviewed to determine whether they coincided with the responses to the call for practices (see below). Many of the same ideas and issues raised in the workshop were also identified in the call.

Call for Practices Methodology. In order to solicit examples of innovative and effective strategies and practices from hospital respiratory protection programs throughout the United States, The Joint Commission put out

Table 1-1: Technical Expert Panel

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Sidebar 1-2: Questions for Small Group Exercise

1. What strategies have you used that have contributed (most) to the effectiveness of your organization's respiratory protection program?
2. What are the biggest challenges you face in implementing your organization's respiratory protection program, and what ideas do you have for overcoming these challenges?
3. How does your organization evaluate the effectiveness of its respiratory protection program? Are staff provided the opportunity to provide feedback? How?
4. How do you ensure that employees are adequately trained in the use of respirators? Are training requirements tailored by risk or likelihood of exposure? How do you ensure that all employees have had fit tests performed? How often do you provide information about proper donning and doffing procedures?

a national call for practices during July and August of 2012. Joint Commission project staff, with guidance from the TEP, formulated a questionnaire that was designed to obtain practice examples addressing training and education, the role of leadership, safety culture, and successful strategies for overcoming obstacles. In addition, the questionnaire asked healthcare organizations to provide successful strategies and practices regarding the proper use of respiratory protection for a variety of different healthcare workers (including frontline medical, surgical, and nursing caregivers; environmental service workers; and staff involved in emergency preparedness and response across a broad range of hazards). The questionnaire was developed using an online survey tool (Qualtrics™)[14] and was pilot tested by twelve individuals identified by the program officer and the TEP during June 2012. Results of the pilot test were reviewed with the TEP, and minor modifications were made to the survey. Because the pilot survey was very similar to the final version, pilot test responses were added to the results from the broader call for practices. The final questionnaire is provided in Sidebar 1-3.

Sidebar 1-3: Final Questionnaire Used in Call for Practices

1. Briefly describe what strategies or practices you feel have contributed most to the effectiveness of your hospital's respiratory protection program.
2. What are the biggest challenges you face in implementing your organization's respiratory protection program? Briefly describe the ongoing challenges and how you have or are attempting to overcome them.
3. Please describe how you tailor training to meet individual employee needs (e.g., likelihood of exposure, professional role, level of education, English proficiency, etc.).
4. How do you evaluate the effectiveness of your training? (e.g., employee knowledge of when to use respiratory protection, appropriate donning and doffing, etc.)
5. Please describe how your program coordinates efforts to address respiratory protection across areas of potential exposures, such as biologic infectious agents, chemical, radiologic and nuclear agents.
6. How do you evaluate the overall effectiveness of your respiratory protection program? How do you get feedback from employees on the effectiveness of the program? Please provide examples of any evidence (quantitative or qualitative) that supports the effectiveness of your program.

The widespread call for practices was released on July 19, 2012. The following dissemination methods were used to solicit responses:

- An e-mail blast was sent by The Joint Commission to subscribers.
- An announcement was posted in the Association of Professionals in Infection Control and Epidemiology (APIC) and American Association of Occupational Health Nurses (AAOHN) e-news bulletins.
- An announcement e-mail was sent to the Association of Occupational Health Professionals (AOHP) members.
- An e-mail posting was made on the California

Department of Public Health statewide infection preventionist list serve.
- TEP members sent notification to personal contacts and affiliations, while also providing additional contact information to project staff.
- Project staff sent individual messages and spoke on the phone with several contacts identified by the TEP and the Project Officer.

Fifty-one responses were received by December 31, 2012.
After adding results from the 12 pilot sites, the final number of responses was 63. Responses were received from 25 states and included the following types of hospitals:
- 40 general medical/surgical hospitals
- 1 long-term acute care hospital
- 9 critical access hospitals
- 11 academic medical centers
- 2 specialty hospitals

To analyze the information, responses were de-identified and coded by categories and subcategories related to the major sections of the questionnaire. A code was assigned every time a particular subcategory was mentioned, regardless of the question in which the comment was made. Each response was independently coded by two of three team members. A third person, who did not assign the original codes, then reviewed the assigned codes to reconcile disagreements and enhance consistency of the process. In total, approximately 920 comments received individual codes.

The TEP reviewed coded responses to identify practices, strategies, or comments that it considered to be innovative, interesting, or potentially helpful to the field for possible inclusion in the monograph. Also, the responses from the NIOSH stakeholder meeting were reviewed to see if any of the practices or strategies identified by participants were in alignment with the recommendations from the TEP. Where appropriate, these examples and strategies were included in the corresponding topic areas of the monograph with permission from the submitting organization (see Appendix C).

1.5 Key Points for Chapter 1

✓ The OSHA standard (29 CFR 1910.134)[3] requires that employers establish and maintain a respiratory protection program for workplaces in which workers may be exposed to respiratory hazards, and respiratory protection is used as an exposure control method.[3]

✓ Studies show that hospitals are experiencing challenges with the implementation of their respiratory protection programs.

✓ This monograph is intended to be a companion document to the other respiratory protection toolkits and resources provided by CDC/NIOSH/NPPTL.

✓ The content of this monograph is derived primarily from self-reported examples of effective practices and was reviewed by the technical expert panel.

✓ Persons responsible for administering and implementing an organizationwide respiratory protection program or those involved with committees or teams that address respiratory protection for workers may find the information in this monograph helpful.

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Chapter 2: Administration of the Respiratory Protection Program

2.1 Program Structure and Overview of Requirements

The purpose of a respiratory protection program (RPP) is to ensure that the use of respirators as a method of controlling respiratory hazards (where engineering and administrative controls are not feasible or sufficient) is implemented in a manner that provides the expected level of protection and does not pose a hazard to workers. In healthcare settings, respirators may be used to protect workers from exposure to aerosol-transmissible diseases (ATDs), such as those for which airborne precautions are recommended,[1,2] as well as to other respiratory hazards such as aerosolized medications, surgical smoke, and high-level disinfectants. Respirators may also be used in hazardous material incidents where hospital personnel serve as first responders and receivers.[2] Examples of healthcare-related hazards that may require the use of respirators are provided in Table 2-1, page 11.

Detailed information on the required elements of a respiratory protection program can be found in the OSHA standard (29 CFR 1910.134) and NIOSH-OSHA toolkit entitled *Hospital Respiratory Protection Program Toolkit: Resources for Respirator Program Administrators* (the National Toolkit).[2] The National Toolkit contains a sample template for a written respiratory protection program, a program evaluation checklist, a description of different types of respirators, and guidance on when to use which type. Readers should refer to the OSHA respiratory protection standards and other sources in Appendix A: Resource Table 1 for basic and advanced information about respirators, training and fit testing requirements, and examples of additional tools.

Issue: Should an organization have a centralized program that addresses all respiratory hazards simultaneously?

There are different sources for respiratory hazards throughout a hospital, and the risk to workers varies according to their job responsibilities and likelihood of exposure. Many different groups, therefore, may need to be engaged in the development and implementation of the hospital's RPP. For example, because clinical staff may be at risk of exposure to ATDs, both they and infection prevention and control staff should be involved in the respiratory protection program. Staff in other areas of the hospital, such as housekeeping, central supply maintenance and emergency management, may confront different respiratory hazards and may also need to be included in the program.

The large number of staff potentially involved in a respiratory protection program prompts this question: Must all respiratory hazards be addressed through a single program under a central administrator or can there be different staff leading respiratory protection efforts for different hazards? A single respiratory protection program with one program administrator is preferred to ensure consistency and accountability.[2] Nevertheless, hospitals have the option of running either one comprehensive respiratory protection program for the entire hospital, which would cover exposure to all inhalation hazards, or having separate programs for infectious exposures and chemical exposures.

The choice of structure depends on many factors. These include whether the hospital is part of a multihospital system or network, the number and physical location of distinct sites, hospital size, staffing resources, and the likelihood of exposure to specific hazards. Important additional considerations include how centralized the organization is, the level of priority given to health and safety resources, and the placement of the program and administrator within the organizational hierarchy. If two separate respiratory protection programs exist to cover respirator responsibilities for chemical versus infectious exposures, the employer must ensure that overall policies are coordinated, that adequate technical expertise is available for each program, and that all aspects of both programs are effectively implemented.[2] The benefits of a single centralized program include centralized management of surveillance, fit testing, and training; more

Table 2-1: Examples of Biological, Chemical, and Radiological Hazards for which Healthcare Workers may Require the Use of Respirators*

Examples of infectious hazards	Examples of noninfectious hazards
• Avian influenza/Avian influenza A (strains capable of causing serious disease in humans)†‡ • Biological terror or warfare agents (e.g., Bacillus anthracis, Francisella tularensis [tularemia])†† • Measles (rubeola)/Measles virus†§ • Microbial agents that become airborne transmissible during aerosol-generating procedures (e.g., seasonal influenza, viral hemorrhagic fevers [including Ebola])†§ • Monkeypox/Monkeypox virus†‡ • Novel or emerging pathogens and any other disease for which public health guidelines recommend airborne infection isolation (e.g., Ebola virus)§ • Severe Acute Respiratory Syndrome (SARS)/SARS-CoV; Middle East Respiratory Syndrome (MERS)/MERS-CoV§‖ • Smallpox (Variola major)/Variola virus†‡ • Spores of environmental fungi that can be released during construction (e.g., *Aspergillus*)‡ • Tuberculosis (TB)/Mycobacterium tuberculosis†‡ • Varicella disease (chickenpox, disseminated shingles/Varicella zoster virus [VZV])†§	• Aerosolized medications (e.g., pentamidine, ribavirin, tobramycin)# • Anesthetic gases (e.g., desflurane, isoflurane, sevoflurance, nitrous oxide)# • Antineoplastic drugs (e.g., during compounding or administration)# • Chemical sterilants for medical instruments and equipment# (e.g., ethylene oxide) • Chemicals released by patients exposed to hazardous materials (e.g., from transportation accidents)†† • Chemicals released by patients exposed to illegal substances (e.g., clandestine methamphetamine labs)†† • Cleaning and disinfection chemicals (e.g., quaternary ammonium compounds, phenols, aldehydes, iodine, chlorine bleach, alcohols)# • High-level disinfectants (e.g., glutaraldehyde, orthophthaldehyde, peracetic acid)# • Laboratory chemicals (e.g., formaldehyde, phenol, xylene)# • Novel or unknown chemical or gaseous agents† • Silica, lead, asbestos and other construction-related respiratory hazards** • Surgical smoke (e.g., in absence of local exhaust ventilation)# • Radiation from radiological incidents or dispersal devices†† • Unidentified or uncharacterized hazardous substances with potential for secondary contamination††

* **Note:** The selection of respirator type depends on the type of hazard and level of protection needed (e.g., filtering facepiece respirators may not be effective against some gas or vapor exposures). This list is incomplete and not intended to be comprehensive. Refer to source documents listed in the resource table for a complete list and additional information on specific hazards as well as selection of respirator type.

Sources:

† California Department of Public Health. Implementing Respiratory Protection Programs in Hospitals: A Guide for Respirator Program Administrators. 2012 May [cited 2013 Oct 15]. Available from: http://www.cdph.ca.gov/programs/ohb/Documents/HCResp-CARPPGuide.pdf

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§ Hospitals should 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 (http://www.cdc.gov/flu/avianflu/h7n9-infection-control.htm and http://www.cdc.gov/coronavirus/mers/infection-prevention-control.html).

‖ Occupational Safety & Health Administration, National Institute for Occupational Safety and Health. Hospital Respiratory Protection Program Toolkit: Resources for Respirator Program Administrators. May 2015. Available from: https://www.osha.gov/SLTC/respiratoryprotection/guidance.html

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†† Occupational Safety and Health Administration, U.S. Department of Labor [Internet]. Best Practices for Protecting EMS Responders during Treatment and Transport of Victims of Hazardous Substance Releases. OSHA 3370-11 2009. [cited 2014 Sep 8]. Available from: https://www.osha.gov/Publications/OSHA3370-protecting-EMS-respondersSM.pdf. See also: Daugherty EL. Health care worker protection in mass casualty respiratory failure: infection control, decontamination, and personal protective equipment. Respir Care. 2008 Feb;53(2):201-12; discussion 212-14.

efficient tracking of compliance information; better coordination, communication, and shared responsibility across the organization; and more efficient use of resources. One possible limitation of a centralized program is that a single individual could have the majority of program knowledge without a back-up plan if that person becomes unavailable. Another potential concern could be a discipline-specific focus, depending on who is leading the efforts and the level of authority given to that person.

2.2 Leadership of the Respiratory Protection Program and Who Should Be Involved

Issue: Who should be in charge of the program? Should it be a single person, a department, or a multidisciplinary team? Should the program be led by staff from employee health or infection control? What about leadership by teams versus individuals?

Regardless of whether there is one comprehensive centralized program or separate programs specific to hazards, hospitals must name a single individual as the administrator for the respiratory protection program (RPP administrator) (29 CFR 1910.134). This does not mean, however, that a single individual must do all of the required tasks. Rather, this individual would work closely with other departments that already have primary responsibility for similar tasks. This person may delegate specific tasks to others in the organization; however, he or she must still provide oversight to ensure that all necessary tasks are carried out. The RPP administrator is not required to have training from a specific discipline such as infection control or occupational health. However, he or she must have the following:

- Appropriate training and knowledge about the principles of respiratory protection
- Knowledge of applicable federal, state, and local respiratory protection program requirements
- Authority to implement the program[2,3]

A list of common responsibilities for the RPP administrator is shown in Sidebar 2-1.

There are many benefits to using a multidisciplinary team to administer the respiratory protection program. This approach can facilitate effective coordination with staff who have responsibility for patient and employee safety across the organization. Examples of team members include persons from occupational or employee health, environment of care and environmental services, patient safety, quality improvement, emergency management, and infection prevention and control. It is critical that the team includes staff members with technical expertise in respiratory protection and its regulatory requirements. The teams should be provided with ade-

Sidebar 2-1: Examples of Common RPP Administrator Responsibilities

- Conduct a hazard assessment and select the appropriate level of respiratory protection for each task or job title with exposure. Record that information in the written respiratory protection program.
- Develop and monitor respirator maintenance procedures.
- Coordinate purchase, maintenance, repair, and replacement of respirators.
- Routinely evaluate the effectiveness of the respiratory protection program, with employee input, and make any necessary changes to the program.
- Provide or arrange for annual training in the use and limitations of respirators.
- Provide or arrange for annual respirator fit testing.
- Maintain records of respirator training, medical clearance, and fit testing.
- Maintain a copy of the written respiratory protection program and program evaluations, and ensure that they are readily accessible to anyone in the program.
- Review the written respiratory protection program at least annually in compliance with the OSHA respiratory protection standard.

Source: California Department of Public Health. Implementing Respiratory Protection Programs in Hospitals: A Guide for Respirator Program Administrators. 2012 May [cited 2013 Oct 15]. Available from: http://www.cdph.ca.gov/programs/ohb/Documents/HCResp-CARPPGuide.pdf

quate numbers of staff and sufficient financial resources, as well as high-level support from executive leadership.

Several examples of using a team approach to oversight and coordination were received from the call for practices. Dameron Hospital in Stockton, CA, coordinates efforts through a subcommittee of the environment of care committee. Participants in this environmental/occupational health & safety subcommittee include the safety officer, nurse epidemiologist, emergency preparedness coordinator, employee health nurse, occupational health manager, and staff development resource specialist.

At Allegiance Health in Jackson, MI, there is a designated RPP administrator, who is also the manager of the respiratory therapy department. They use a team approach to administer the program and work hard to ensure the right people are involved. There is a standing respiratory protection committee that meets several times per year and includes a wide range of stakeholders. In addition to clinical staff from infection control, nursing and occupational health, the team includes representatives from environmental safety, laboratory, purchasing, warehouse, and construction-related departments (e.g., when asbestos abatement is needed). This committee reports results to leadership through an environment of care safety committee, which then reports to a quality and board-level committee.

Additional examples of how a team approach can be used to distribute responsibilities for training and fit testing are included in Chapter 3.

2.3 Authority, Cooperation, and Accountability

Issue: How can the RPP administrator ensure the cooperation of staff from other departments?

It is often necessary to distribute responsibility for different operational aspects of the program across departments and functional areas in order to accomplish, in a practical manner, required activities within expected time frames. However, while distributing activities can be more efficient, doing so can also challenge program administrators with operational issues related to authority and accountability. This is likely to occur when voluntary cooperation from other areas is not accompanied by the authority and resources needed to ensure timely and thorough completion of the tasks.

In the call for practices, several hospitals described how they delegate activities across areas. For example, at St. Mary's Hospital in Madison, WI, respiratory protection policies and procedures were developed collaboratively by staff from infection prevention and control, safety, and employee health. Employee health staff are responsible for the medical evaluation and clearing the employee for fit testing. Safety staff trains employees in each unit who then conduct respirator fit testing of all unit employees. It is up to an individual department to determine who needs to be fit tested. Any staff member who may come into contact with a patient on airborne precautions is included in the respiratory protection program, as well as all of the respiratory therapy staff, environmental services, and certain units throughout the hospital, depending on the type of patients they see. As described in Case Study 2.1, beginning on page 21, Vanderbilt University Medical Center employs collaboration between various "owners" of the program to ensure all components of the program are covered. Staff from the safety area provides fit testing services, occupational health staff provides medical surveillance and database management, and organizational leaders provide necessary resources.

Issue: How can full staff compliance be encouraged? Do incentives or penalties help improve compliance?

According to the OSHA respiratory protection standard (29 CFR 1910.134), hospitals must determine a policy and expected levels of adherence to the policy for both direct employees and for nonemployees who could be exposed to respiratory hazards while in the hospital.[4] Nonemployees include persons such as physicians and other licensed independent practitioners, students, contractors, and volunteers. It is recommended that all people working and volunteering in the hospital be required to follow infection control policies, including respirator use.[2] Leadership, management, and key staff—especially the RPP administrator—should be very clear about who is responsible for implementing specific elements of the respiratory protection program for both employees and nonemployees, as specified in the written program. An example of a written respiratory protection program is available in the National Toolkit.[2]

The best way to help staff understand why respirators are necessary for their protection is to provide effective training and education. This is an essential first step in encouraging compliance with the program. Vanderbilt University Medical Center discovered that by making compliance with all safety programs (including the respiratory protection program) a part of the annual performance review required of all staff, compliance rates for fit testing have increased. Other factors contributing to high compliance levels include posting the Vanderbilt respirator program policies online, posting fit test dates and times online, and promoting awareness of airborne infectious hazards with webinars. (See Case Study 2.1 for more information.)

Some hospitals enforce consequences for not adhering to the policy. For example, at Charles George Veterans Affairs (VA) Medical Center in Asheville, NC, part of VISN-6, leadership support is key. The director stated that until properly trained, a healthcare worker could not provide direct patient care (see Case Study 3.1 for more information). At Brandon Regional Hospital, compliance is enhanced by communication with department directors. Directors are provided fit testing due dates for their employees on a biweekly basis and noncompliant staff are taken off the schedule until requirements are completed.

2.4 The Role of Organizational Leadership and the Relationship to Safety and Quality Improvement

Issue: What is the role of hospital leadership in the respiratory protection program?

Hospital leaders, defined broadly, include persons at the executive level as well as departmental or service line managers. Leaders can also be frontline staff who are knowledgeable and influential role models within units and departments. Such hospital leaders should be aware of the respiratory protection program and understand its importance to the organization, as they play a critical role (both directly and indirectly) in its success.

Leadership has direct authority over resource allocation. Resource-related issues include the following:

- Staffing—including allocating sufficient time and training for the RPP administrator to do program-related work, determining the appropriate level of staff dedicated to the program, and prioritizing the respiratory protection program relative to other important issues
- Equipment availability, inventory, maintenance, and storage—including providing appropriate respirators and testing equipment, ensuring inventory is current and operational, and replacing defective and discontinued models as needed

Leaders determine the level of authority that program administrators have to ensure high levels of compliance for all staff. Leaders are also involved in determining incentives and penalties related to policy enforcement. Finally, leaders are ultimately accountable for ensuring compliance with OSHA regulations as well as other state, federal, and local requirements.

The Institute for Healthcare Improvement's (IHI) white paper "Leadership Guide to Patient Safety" describes the role of leadership in safety as "to establish the value system in the organization; set strategic goals for activities to be undertaken; align efforts within the organization

to achieve those goals; provide resources for the creation, spread, and sustainability of effective systems; remove obstacles to improvements for clinicians and staff; and require adherence to known practices that will promote patient safety."[5(p.1)]

Leadership directly influences the organizational culture of a hospital and the extent to which it prioritizes safety for patients and staff.[6] Leaders should demonstrate a visible commitment to safety across many areas, including the respiratory protection program. This goal can be accomplished in a variety of ways, including the following:

- Actively promoting and participating in quality and safety improvement initiatives
- Conducting senior leadership walkarounds, observations, and interactions with staff on units
- Leading by example (senior management visibly using respirators)
- Participating in the evaluation of program effectiveness
- Empowering frontline staff to make decisions
- Establishing an open-door policy for staff to express concerns and ask questions
- Providing ongoing communication to staff that emphasizes the importance of the program(s)

Issue: How does an effective respiratory protection program relate to patient safety and contribute toward becoming a high reliability organization?

Protecting workers from infectious respiratory hazards also protects patients by preventing disease transmission. If a worker gets an ATD, there may be a period of time during which he or she is asymptomatic but infectious to patients as well as other workers. There are several other areas in which safety for both workers and patients overlap. A recent report from the National Patient Safety Foundation pointed out that it is impossible to have safety for patients without safety for workers:

> "To create a safe and supportive work environment, health care organizations must become effective, high reliability organizations, characterized by continuous learning, improvement, teamwork, and transparency. Effective organizations care for their employees and continuously meet preconditions not subject to annual priority and budget setting. The most fundamental precondition is workforce safety, physical and psychological. The workforce needs to know that their safety is an enduring and nonnegotiable priority for the governing board, CEO, and organization."[7(p.ES2)]

Having an organizational culture that supports safety in combination with leadership involvement is essential to improving the quality and safety of care for patients.[8,9] Similarly, safety culture and leadership involvement have long been identified as key factors in establishing high reliability work places that strive to eliminate mistakes and prevent injuries and illnesses among workers.[10,11]

High reliability organizations have been defined as "systems operating in hazardous conditions that have fewer than their fair share of adverse events."[12(p.769)] As described in a recent Joint Commission publication entitled *Improving Patient and Worker Safety: Opportunities for Synergy, Collaboration and Innovation,* high reliability organizations are deeply concerned with safety and value near-miss events as opportunities to learn how to improve.[13] This preoccupation with safety must include both patient and worker safety simultaneously, since staff working conditions are related to patient safety as well as occupational safety.[14] It would be expected, therefore, that high reliability healthcare organizations integrate many patient and worker safety activities—structurally and/or functionally—within the organization.

Chassin and Loeb describe the following three interdependent and essential changes that healthcare organizations must undergo to become highly reliable:[15]

1. Leadership must commit to the goal of high reliability.
2. An organizational culture that supports high reliability must be fully implemented.
3. The tools of robust process improvement must be adopted.

Weick and Sutcliffe's work has found that high reliability organizations are characterized by the following five attributes:[16]

1. Preoccupation with failure—Valuing, identifying, reporting, sharing, and correcting errors, mistakes, or lapses in all aspects of the system
2. Reluctance to simplify interpretations—Resisting the

Sidebar 2-2: OSHA Resources on Hospital Safety and Health Management Systems

Resources Related to Understanding the Problem

- *Worker Safety in Your Hospital: Know the Facts.* This four-page booklet provides a concise summary of injury and illness rates, the major causes of injuries, costs, and solutions. It is a high-level overview sprinkled with examples to inspire hospital administrators and staff to take action.
- *Facts About Hospital Worker Safety.* This compendium presents data from the Bureau of Labor Statistics, workers' compensation insurers, and detailed studies. For safety managers and others who want to explore the issue in depth, this booklet offers a comprehensive look at how hospital workers are getting injured, which occupations are most at risk, how much these injuries cost (including "hidden" costs), and how thorough recordkeeping can help you identify problems and solutions.
- *How Safe Is your Hospital for Workers? A Self-Assessment.* This three-page questionnaire encourages data-driven self-evaluation by providing an opportunity for top administrators to talk with safety managers to find out how your injury rates compare with hospitals nationwide—and how these injuries affect your bottom line.

Resources Related to Safety and Health Management Systems

- *Integrating Patient and Workplace Safety Programs: Lessons from High-Performing Hospitals.* This brief summary for hospital administrators uses real-world examples to demonstrate the value of a systematic process for proactively addressing workplace safety.
- *Safety and Health Management Systems and Joint Commission Standards: A Comparison.* This table shows how core elements of a safety and health management system relate to Joint Commission hospital accreditation standards. You will see that safety and health can easily be integrated into existing Joint Commission compliance plans.
- *Hospital Safety and Health Management System Self-Assessment Questionnaire.* This detailed tool can help safety managers determine how many of the recommended elements of an occupational safety and health management system are in place at your hospital and identify opportunities for improvement.
- *Safety and Health Management Systems: A Roadmap for Hospitals.* This guidebook describes the six core elements of a safety and health management system and provides strategies for implementing them in a hospital setting. It features success stories and best practices from a variety of hospitals.

Source: Occupational Safety & Health Administration [Internet]. Washington, DC; [cited 2014 May 15]. Worker Safety in Hospitals: Caring for our Caregivers. Available from: https://www.osha.gov/dsg/hospitals/

adoption of simple or superficial explanations and solutions and appreciating the complex interrelationships within systems and processes

3. Sensitivity to operations—Maintaining constant awareness of how well systems and processes are functioning, and implementing appropriate responses to deviations
4. Commitment to resilience—Recognizing that errors will occur and establishing multiple redundant mechanisms to prevent harm or mitigate risk at different points in the process
5. Deference to expertise—Allowing decisions to be made quickly by knowledgeable frontline workers who are closest to the problem and avoiding excessive deference to authority

Ultimately, a highly reliable respiratory protection program is one in which all staff who need to use respirators have the proper training, knowledge, equipment, time, and support, and actually use the appropriate respirators when indicated. The program also has the management systems and processes for ensuring consistent, error-free operations during routine work as well as the ability to scale up efforts during emergencies. While this may seem like a tall order, it is the ultimate—and potentially achievable—goal of exemplary programs. Additional

information on high reliability in health care can be found at http://www.jointcommission.org/highreliability.aspx.

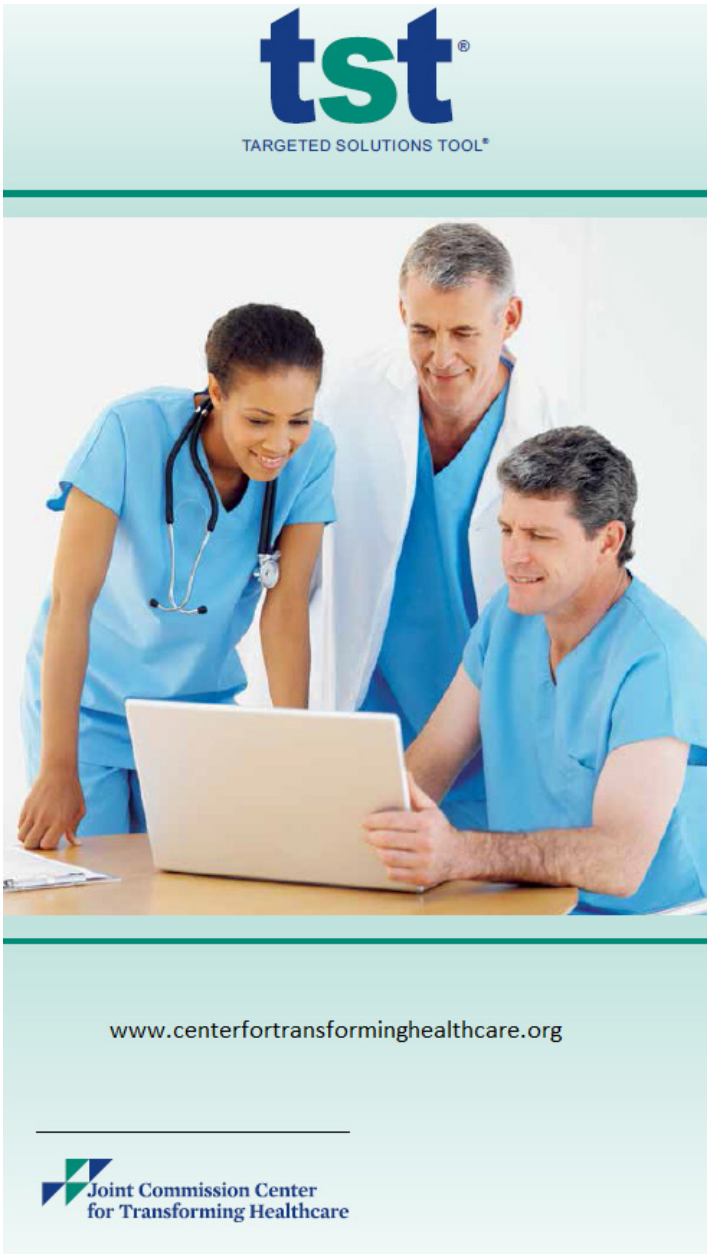
OSHA recently published a comprehensive series of guidance documents and tools that address how high reliability concepts support worker safety through effective safety and health management systems. This helpful set of resources is described in Sidebar 2-2, page 16, and is available at http://www.osha.gov/dsg/hospitals.

Issue: How might quality improvement initiatives impact a respiratory protection program?

There are several excellent examples of hospitals implementing structured quality improvement (QI) initiatives for their respiratory protection program. In particular, the use of Lean Six Sigma as a structured QI process is gaining popularity nationwide. Lean Six Sigma is a blended methodology that focuses on reduction of waste, quantitative identification of problem areas, and demonstration of improvement through a five-stage process: (1) define, (2) measure, (3) analyze, (4) improve, and (5) control.[17] During the call for practices, two hospitals submitted examples of using Lean and Six Sigma methods to improve their respiratory protection programs. Their experiences are described in Case Studies 2.2 and 2.3.

Issue: What is The Joint Commission's role in respiratory protection programs?

The Joint Commission strongly encourages hospitals to adopt a high reliability approach to improving safety. To promote high reliability practices and drive change, The Joint Commission Center for Transforming Healthcare was established in 2009. The Center aims to solve health care's most critical safety and quality problems by using a systematic approach to analyze specific breakdowns in care, discover their underlying causes, and then develop targeted solutions. The Center is developing solutions through the application of the Robust Process Improvement™ (RPI) tools and concepts that other industries have long relied on to improve quality, safety, and efficiency. RPI methods and tools include Lean, Six Sigma, change management tools, and the Targeted Solutions Tool® to achieve high reliability. More information on the Center for Transforming Healthcare is available at



http://www.centerfortransforminghealthcare.org/about/default.aspx.

Several Joint Commission standards relate directly or indirectly to respiratory protection. Though The Joint Commission does not formally evaluate compliance with OSHA standards during an on-site survey, hospitals are expected to be in compliance with Joint Commission Leadership (LD) Standard LD.04.04.01, which requires that hospitals comply with existing federal, state, and local laws and regulations.[18] Other relevant Joint Commission standards include Environment of Care (EC) Standards EC.02.01.01, which states that "the hospital

manages safety and security risks," and EC.02.02.01, which states that "the hospital manages risks related to hazardous materials and waste." Standard LD.03.01.01 states that "leaders create and maintain a culture of safety and quality throughout the organization."

Implementation of a quality improvement initiative focused on the respiratory protection program is consistent with Joint Commission requirements related to performance improvement. For example, Performance Improvement (PI) Standard PI.03.01.01 states that "the hospital improves performance on an ongoing basis." These initiatives can be shared with surveyors as evidence of efforts to improve safety for both patients and workers.

Appendix B of this monograph lists examples of Joint Commission standards that directly or indirectly relate to respiratory protection programs. For an example of commonalities between Joint Commission and OSHA standards across a variety of topic areas, refer to Appendix A of the 2012 monograph *Improving Patient and Worker Safety: Opportunities for Synergy, Collaboration and Innovation*.[13]

Clinicians sometimes encounter complicated patient care situations in which Joint Commission standards overlap with OSHA requirements and questions arise. For guidance on interpretation of Joint Commission standards as they relate to respiratory protection programs, readers should contact the Standards Interpretation Group by phone at 630-792-5900 or electronically at https://web.jointcommission.org/sigsubmission/sigsubmissionform.aspx.

For guidance specific to OSHA requirements, please consult the following:

Online: Frequently asked questions: (https://www.osha.gov/OSHA_FAQs.html)
Email: https://www.osha.gov/ecor_form.html
Phone: 1-800-321-OSHA (6742) Toll-free U.S.
Address: U.S. Department of Labor
Occupational Safety & Health Administration
200 Constitution Avenue
Washington, DC 20210

Sidebar 2-3: CMS Draft Infection Control Worksheet Questions Related to Respiratory Protection

1.D.6 The hospital infection control system ensures the facility has a respiratory protection program that details required worksite-specific procedures and elements for required respirator use.

☐ **Yes** ☐ **No** ☐ **N/A**

1.D.7 The hospital infection control system ensures that respiratory fit testing is provided at least annually to appropriate healthcare personnel.

☐ **Yes** ☐ **No** ☐ **N/A**

1.D.8 Hospital has well-defined policies concerning contact of personnel with patients when personnel have potentially transmissible conditions. These policies should include:

- work-exclusion policies that encourage reporting of illnesses and do not penalize with loss of wages, benefits, or job status
- education of personnel on prompt reporting of illness to supervisor and occupational health

☐ **Yes** ☐ **No** ☐ **N/A**

1.D.9 Aggregated rates of TB-test conversion are periodically reviewed by the Infection Control Officer to determine the need for corrective action plans.

☐ **Yes** ☐ **No** ☐ **N/A**

4.H.1 NIOSH-approved particulate respirators (N95 filtering facepiece respirator [N95 respirator] or higher) are available and located near point of use.

☐ **Yes** ☐ **No** ☐ **N/A**

4.H.5 Healthcare personnel wear a NIOSH-approved particulate respirator (N95 respirator or higher) upon entry into the AIIR for patients with confirmed or suspected TB. Facility policies are followed for other pathogens requiring AIIR.

☐ **Yes** ☐ **No** ☐ **N/A**

AIIR = airborne infection isolation rooms; TB = tuberculosis.
Source: Centers for Medicare & Medicaid Services, Center for Clinical Standards and Quality/Survey & Certification Group. Memorandum entitled "Patient Safety Initiative FY 2013 Pilot Phase – Revised Draft Surveyor Worksheets" Released to public on November 9, 2012. Available from: https://www.cms.gov/Medicare/Provider-Enrollment-and-Certification/SurveyCertificationGenInfo/Downloads/Survey-and-Cert-Letter-13-03.pdf

Issue: In addition to OSHA, are there other healthcare oversight and regulatory bodies that address respiratory protection programs?

Regardless of whether the hospital is accredited by The Joint Commission or a different accrediting body or not accredited by any organization, in order for a healthcare organization to participate in and receive payment from the Centers for Medicare & Medicaid Services (CMS) Medicare or Medicaid programs, it must meet the eligibility requirements for program participation, including a certification of compliance with the Conditions of Participation (CoP) set forth in federal regulations (42 CFR 482). This certification can be based on a survey conducted by a state agency on behalf of CMS or by a deemed national accrediting organization that has and enforces standards that meet or exceed Medicare's CoPs.

The CMS Survey and Certification Group recently undertook a pilot patient safety initiative that involves providing structured worksheets for surveyors to assess hospital compliance with three areas: quality assessment/performance improvement, discharge planning, and infection control. The draft worksheet for infection control, which was tested in 2011 and 2012, contains items related to respiratory protection programs. A revised version of the worksheet was being implemented in a nonpunitive manner across states on a small scale in 2013. Relevant items from the pilot worksheet are described in Sidebar 2-3, page 18.

2.5 Key Points for Chapter 2

- ✓ Regardless of whether they have one comprehensive centralized program or separate programs specific to different types of hazards (for example, chemical versus infectious), hospitals must name a single individual as the administrator for the respiratory protection program.
- ✓ Using a multidisciplinary team approach to administer the program can facilitate effective coordination across the organization with staff concerned with safety for both patients and workers.
- ✓ Hospital leaders should be aware of and fully support the respiratory protection program and understand its importance to the organization.
- ✓ Some hospitals have used structured QI methodologies such as Lean and Six Sigma to improve their respiratory protection programs.

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Case Studies for Chapter 2

Case Study 2.1: Vanderbilt University Medical Center (VUMC): An Example of Working Collaboratively Across Departments Toward a Successful Respiratory Protection Program

Vanderbilt University Medical Center (VUMC) is a 1,019-bed tertiary care academic medical center located in Nashville, Tennessee. The medical center complex employs over 19,300 faculty and staff across multiple services and settings, including a children's hospital, a psychiatric hospital, and numerous ambulatory clinics in surrounding counties. The hospital has over 55 negative pressure rooms distributed across 20+ different units.

The respiratory protection program is run primarily by staff from the environmental health and safety department with close collaboration from staff in the occupational health clinic. Respiratory hazards that are addressed by the respiratory protection program policies and procedures include airborne infectious diseases (such as TB) but also chemical/pharmaceutical, biological, and animal care–related sensitivities that affect employees of the medical center.

Determining Which Employees Need Respirator Fit Testing and Training

The respiratory protection program requirements are evaluated by the working group, with input from infection control and prevention staff to determine employees who may need respiratory protection for biological infectious pathogens. Job tasks are evaluated to determine if there is work-related employee exposure to infectious agents either from lab processes or patient care, exposure to chemicals or hazardous aerosolized pharmaceuticals, or exposure to animal allergens. Standard industrial hygiene practices are applied to minimize employee exposures and minimize the number of individuals in the program.

The largest group of respirator users in the medical center program includes staff whose job duties require them to do the following:

- Enter rooms where patients are on airborne precautions isolation or provide care to patients on airborne precautions in outpatient or procedural units that require the patient to remove his/her surgical face mask
- Perform certain high-risk procedures for patients on airborne precautions
- Service air-handling equipment for negative-pressure isolation rooms

Using this criteria, the total number of staff included in the program is considerable—over 8,300 persons. This number may increase significantly if a virus is pandemic (such as H1N1 or SARS at the time they first emerged) and CDC expands its recommendations for use of respiratory protection during patient care.

Another identified group that requires respiratory protection includes employees who are exposed to aerosolized medications while performing tasks such as cleaning incidental spills of chemotherapy drugs or administering ribavirin or pentamidine. Other identified groups use respiratory protection due to exposure to animal allergens, participation on the organizational hazardous spill team, participation on the first receiver/decon team, and job-related exposure to specific chemical hazards (such as formaldehyde).

Fit Testing and Training Implementation

The primary respirator type used at VUMC for infectious aerosols is the N95 filtering facepiece respirator (N95 respirator). There are several areas that have also acquired (loose-fitting) powered air purifying respirators (PAPRs) for staff with facial hair or staff who, for various reasons, could not be fitted with an N95 respirator. VUMC environmental health and safety department manages the fit testing for negative pressure respirators and training for the PAPRs regardless of the programmatic reason requiring respirator usage.

Photo courtesy of Vanderbilt Environmental Health and Safety

Given the size and complexity of the organization, it is essential to have multiple departments and staff engaged in annual fit testing, training, and evaluation activities. Staff from environmental health and safety use a multipronged approach to implementing fit testing:

1. They participate in new staff orientation sessions and conduct the fit testing during those sessions.
2. They offer standing times (about 8–12 hours per week) during which staff can come to their offices for fit testing and training.
3. They provide annual fit testing and training at major in-house educational venues, including departmental "competencies" days.
4. They support some medical units, such as medical air transport and neonatal intensive care, that have specially trained nurse educators who conduct fit testing and training while staff remain on the unit.

Training occurs during fit testing but is supplemented through VUMC's online learning management system known as VandySafe. There is a VandySafe training module that specifically addresses infection control practices, isolation categories, and associated personal protective equipment (PPE), including respirator use. Employees who utilize respirators for other programs also receive training either through VandySafe or live venues. Training is evaluated by completion of an online test.

Tracking and Ensuring Compliance

VUMC environmental health and safety staff enter fit testing information directly into the occupational health information system, which is designed to manage health and health-compliance data for employees. This system is interfaced to receive employee demographic data directly from the human resources system and is used to identify groups of employees that require specific vaccines or PPE or that have other health and safety needs and then track compliance.

Compliance reports are generated automatically by the database and updated daily on the hospital intranet site. Periodic reports are also provided to leadership and unit managers regarding overall compliance with respirator fit testing and other occupational health compliance programs such as TB skin testing and vaccinations.

The information system also interfaces with the employee performance evaluation system. The annual performance evaluation tool includes one item related to compliance with occupational health requirements (including respirator fit testing, TB testing, vaccinations, and hazard training) that is tailored to job responsibilities. If this item is unsatisfactory, the employee may not receive salary increases and managers are alerted to take appropriate action to ensure the employee's compliance.

The information management system is an incredible asset to the respiratory protection program. The system is a "one-stop shopping" site where employees and managers can easily evaluate employee compliance with occupational health programs, including status of annual fit testing compliance.

The VUMC environmental health and safety and occupational health departments work continuously with physician leadership and the graduate medical education office to improve compliance rates for residents and other medical staff. The graduate medical education and the faculty orientation and training offices post daily reports to a faculty and provider information portal that notifies providers when they are due for fit testing and training.

Evaluation of the Program

VUMC uses several mechanisms to evaluate the respiratory protection program, including observation of PPE use and the various compliance reports. The annual fit testing process is used to evaluate employee competency in donning and doffing the respirators. While annual fit testing is a requirement, environmental health and safety staff have determined that the most beneficial aspect of annual face-to-face contact with respirator users is hands-on practice in correct use of the PPE. Use and availability of PPE are also assessed during the semiannual environment of care safety audits performed in the various patient care units. Survey teams are asked to look for PPE stocks and query staff about use of PPE.

VUMC has also employed an innovative approach to respirator program evaluation over the last two years. Occupational health staff designed and implemented an electronic survey using the Research Electronic Data Capture (REDCAP) platform. The survey is sent

monthly to a sample of approximately 150 persons who are likely to have used a respirator (those who have been fit tested in the previous month and are not new to the institution). With a strong response rate of 35%–40%, respiratory protection program staff use the results to (1) evaluate the effectiveness of training and the overall program, (2) follow-up with staff concerns related to specific products and offer alternatives, and (3) identify topics in need of additional training.

Other Program Considerations

The respiratory protection program also collaborates with staff from the departments of emergency preparedness, infection control and prevention, supply chain, and administration. Day-to-day interaction with these services facilitates communication and cooperation during emergency situations. Though emergency situations such as H1N1 can stress the organization and supply line, the foundational respiratory protection program is used to provide training and fit testing as needed.

Even with a sophisticated program such as VUMC's, challenges remain. In particular, the ability to benchmark, annual fit testing, inventory management, managing regulatory changes and stockpiling are challenging. Nevertheless, many of the practices in place at VUMC represent creative solutions to common implementation challenges, and the overall respiratory protection program can serve as a model for other complex healthcare organizations.

Case Study 2.2: OSF Saint Francis Medical Center: Using the Six Sigma Methodology to Streamline and Standardize the Respiratory Protection Program

OSF Saint Francis Medical Center (SFMC) applied the Six Sigma methodology to address the challenge of fit testing all staff and to ensure adequate respirator supplies. Saint Francis is a nonprofit acute care teaching medical center in Peoria, IL. It is owned and operated by The Sisters of the Third Order of Saint Francis, which has more than 600 beds, 800 physicians on the medical staff, and approximately 6,000 employees. As the fourth largest medical center in Illinois, SFMC serves both a small metropolitan and large rural population and is the only Level 1 Trauma Center and tertiary care medical center in the area. It is a major teaching affiliate of the University of Illinois College of Medicine at Peoria.

During the H1N1 outbreak in early 2010, it became clear to SFMC employee health staff that SFMC did not have sufficient staff and equipment resources to adequately fit test all staff in over 200 departments and provide education on the use of respirators. Prior to 2010, SFMC relied primarily on PAPRs for staff needing respiratory protection, but the health system was now recommending use of N95 respirators across all their hospitals. With any new system policy, a change in practice is required. For a medical center with more than 6,000 employees, this was a huge undertaking. The decision was made to utilize a Six Sigma process to determine the best way to ensure the policy was followed and adequate protection was available for employees.

The Six Sigma methodology is comprised of five phases known as DMAIC: Define (D), Measure (M), Analyze (A), Improve (I), and Control (C). In December 2010, SFMC created a team that included representatives from key stakeholder departments including nursing, occupational health, supply safety, disaster preparedness, infection control, and corporate engineering. With facilitation from a trained Six Sigma "Black Belt," the team came to agreement on a charter, which was a document that clearly defined the opportunity for improvement, the goals, the time lines, the business case, and the project scope, as well as team members and executive sponsors.

During the Measure and Analyze phases, the team identified local challenges and assessed current fit testing capacity (aka "throughput"). They found that they had 15 employees who were competent to conduct fit testing, and about 30 minutes were required to fit test up to four employees simultaneously when following OSHA guidelines. Because of the large number of community

physicians on staff as well as the ever-changing roster of medical students and residents, SFMC was challenged with applying the OSHA requirements to their physicians. They also encountered a common information technology challenge whereby the human resources computer system and the system used for documentation of fit testing did not "talk" to each other, which resulted in the need for redundant paperwork across departments.

During the Measure phase, they conducted a survey to determine which staff (by job category) were at risk for exposure. The survey questions were derived from the CDC guidelines for tuberculosis exposure. Responses were grouped by department and job title. Items included the following:

1. Is the employee (or group of employees) a healthcare worker who works in a department where there is at least one negative pressure isolation room? (Yes or No)
2. Does the employee(s) perform a high-hazard procedure such as bagging a patient or performing mouth-to-mouth resuscitation on a patient with a respiratory communicable disease (i.e., TB, Severe Acute Respiratory Syndrome [SARS], chickenpox, disseminated shingles, or a biological pathogen)? (Yes or No)
3. Does the employee(s) perform or participate in a cough-inducing procedure such as an endoscopy? (Yes or No)
4. Does the employee come within six (6) feet of a potentially infectious patient? (i.e., TB, SARS, chickenpox, disseminated shingles, or a biological pathogen)? (Yes or No)
5. Are there other hazards the employee(s) is exposed to (paint, fumes, chemicals, noise, etc)? (Yes or No) Please list/describe hazards.

If managers answered yes to any of the questions above, then employees meeting those criteria were enrolled in the respiratory protection program for tracking of education and fit testing. Ultimately, SFMC reduced the number of staff determined to be at risk of exposure to approximately 2,350 employees.

In the Improve phase, the team identified solutions to address their specific challenges. For example, they implemented a consolidated reporting system that provides data for quarterly reporting both to unit managers and to hospital leadership through the environment of care and safety committees. For the Control phase, the system tracks education and fit testing compliance levels, which have improved steadily over time. Though the team completed its activities in July 2012, they recognize that challenges remain (e.g., physician compliance) and are working on continuously improving the program. Overall, SFMC staff found value in applying the Six Sigma methodology for improving their respiratory protection program and would recommend applying a structured approach to other hospitals in similar situations.

Case Study Table 2-1, pages 25–26, shows an example of the program metric table used to evaluate the program by OSF Saint Francis.

Case Study Table 2-1: Process Management Control System from OSF Saint Francis Medical Center

Process Management Control System
Respiratory Protection Program for Employees-Fit Testing N95 (#)
June 29, 2012

Primary "Served" by the Process: Patients	**CCRs:** - Standard process for managing fit testing of N95 masks for SFMC employees, Standardized documentation for completed fit testing, Hazard assessment for SFMC employees (determination of respiratory risks), and Standard RPP education.					
Outcome Indicators (Ys)	**Upstream Indicators (Xs)**		**Capturing Data**			
	• Name • Numerator & Denominator or description	Operational Definition	"Physical" Item to Check	When to Check	Who Performs Check	Recovery Action
Respiratory Protection Program Compliance **Target: 90%** **Threshold:** 85% **Outstanding:** 95% **Target Date =** Oct. 2013	▪ **Name**: Respiratory Protection Program Compliance. ▪ **Numerator**: Count of SFMC employees that have completed all three components of Respirator Protection Program: OSF SFMC Respirator Protection Program education module, medical questionnaire, and OSF SFMC Respirator FIT Clinic. ▪ **Denominator:** Total number of SFMC employees that require respiratory protection (based on Hazard Assessment).	**Respiratory Protection Program Compliance** = Employee completion of annual medical evaluation, fit test, and training.	HealthStream Fit Test Clinic report along with Fit Test Record Or PAPR education module certificate	Report to be run Quarterly	Employee Health designee	Occupational Health will provide dept./unit managers with a completion rate report on a quarterly basis. If a unit is not meeting target: The dept./unit manager will address non-compliance. Contact COH department to make arrangements for medical evaluation, fit test, and training.
Hazard Assessment Completion **Target:** 100% by August 1, 2012	▪ **Name:** Hazard Assessment Completion. ▪ **Numerator:** Total # of SFMC Managers with completed hazard assessment forms for their departments job titles. ▪ **Denominator:** Total # of SFMC Managers.	**Hazard Assessment** = Form completed by unit/department manager assessing the hazards a group of employees with similar exposures may encounter. The hazard assessment determines whether or not an employee is to enroll in the Respiratory Protection Program.	HealthStream SharePoint Survey; results to be exported to COH excel spreadsheet	Annually (August)	COH designee	Occupational Health will report the Hazard Completion Rate to Administration, Directors, and Managers. If a manager is not meeting target their director will address non-compliance. Contact COH department to make arrangements for medical evaluation, fit test, and training.

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(Continued on page 26)

Case Study Table 2-1: Process Management Control System from OSF Saint Francis Medical Center (continued)

Respiratory Protection Education Module Completion **Target:** 90% **Threshold:** 85% **Outstanding:** 95% **Target Date =** Oct. 2013	▪ **Name**: OSF SFMC Respirator Protection Program education module completion rate ▪ **Numerator**: # of SFMC employee's with OSF SFMC Respirator Protection Program module completion certificates. (HealthStream) ▪ **Denominator**: Total # of SFMC employee's assigned the OSF SFMC Respirator Protection Program module.	**OSF SFMC Respirator Protection Program education module** = HealthStream education module objectives include: • Identify why the respirator is necessary and how improper fit, usage, or maintenance can compromise the protective effect of the respirator.	HealthStream Report	Monthly	Unit/Dept manager, clinical educator, or designee	Occupational Health will provide dept./unit managers with a completion rate report on a monthly basis. If a unit is not meeting target: The dept./unit manager will address non-compliance. Contact COH department to make arrangements for medical evaluation, fit test, and training.
PAPR Education Module Completion **Target:** 90% **Threshold:** 85% **Outstanding:** 95% **Target Date =** Oct. 2013	▪ **Name**: OSF SFMC Powered Air Purifying Respirator (PAPR) Return Demonstration module completion rate ▪ **Numerator**: # of SFMC employee's with OSF SFMC Powered Air Purifying Respirator (PAPR) Return Demonstration module completion certificates. (HealthStream) ▪ **Denominator**: Total # of SFMC employee's assigned the OSF SFMC Powered Air Purifying Respirator (PAPR) Return Demonstration module.	**OSF SFMC Powered Air Purifying Respirator (PAPR) Return Demonstration education module** = HealthStream education module objectives include: • Demonstrate correct use of Powered Air Purifying Respirator (PAPR)	HealthStream Report	Monthly	Unit/Dept. manager, clinical educator, or designee	Occupational Health will provide dept./unit managers with a completion rate report on a monthly basis. If a unit is not meeting target: The dept./unit manager will address non-compliance. Contact COH department to make arrangements for medical evaluation, fit test, and training.

Page 2 of 2

Source: OSF Saint Francis Medical Center, Peoria, IL. Used with permission.

Case Study 2.3: Increasing the Efficiency of the Respiratory Protection Program Using Lean Six Sigma at BJC HealthCare

BJC HealthCare, one of the largest nonprofit healthcare organizations in the U.S., provides services to residents of urban, suburban, and rural communities in the greater St. Louis, southern Illinois, and mid-Missouri regions. The system includes 12 hospitals and multiple community health service organizations. BJC HealthCare has applied the methods of Lean, Six Sigma, Kepner-Tregoe, Project Management and Change Management to a wide range of clinical and operational practices for more than ten years. Through their Center for Clinical Excellence, staff throughout the organization have been trained and certified as Six Sigma Black Belts and Lean Six Sigma Facilitators. In December 2008, staff at BJC Occupational Health Services identified a need to focus on the N95 respirator fit testing process throughout their organization. Fit testing processes were not consistent within and between the hospitals. A multidisciplinary team was established to standardize the fit testing process to ensure both patient and healthcare personnel safety. Examples of questions needing answers included: Were the right people in the right departments being fit tested annually? Were personnel being fit tested unnecessarily? Did all personnel need fit testing annually or could some move to a just-in-time model?

The team of 11 members, with representation from six BJC hospitals, included expertise from occupational health, infection prevention, supply management, and environmental health and safety. An executive champion and a process owner were established and the team was facilitated by a trained Lean Six Sigma Facilitator. A certified Six Sigma Black Belt was utilized as a key partner for support and guidance. The team held day-long meetings on a monthly basis. A one-year time line was established with a goal of developing an efficient process for fit testing appropriate personnel by December 31, 2009. The process would be implemented beginning January 2010.

The N95 respirator fit testing team identified the following issues and opportunities: (1) fit testing was being performed on personnel who may never be required to don an N95 respirator; (2) identification of personnel required to wear an N95 respirator was not standard; (3) the processes for medical screening and documentation of fit testing and training were inconsistent; (4) overall compliance levels were lower than desired; (5) it was unclear where the administrative responsibility for the respiratory protection plan fell; and (6) there was a consistent incremental increase in costs associated with fit testing (resources, personnel and time) over time.

After agreeing on a team operating agreement, a charter was developed to clarify the team purpose and goals. The Six Sigma phases of Define, Measure, Analyze, Improve and Control (DMAIC) were utilized, as well as process improvement tools applicable to each phase, to work through the project. Each team member was expected to actively participate by surveying key departments and personnel at their hospital and reporting findings in order to develop a best practice. Regular tollgate reports were given to leadership to keep them informed and to keep the team focused.

The N95 respirator fit testing team used improvement tools such as a process map, a cause-and-effect diagram (also known as a fishbone or Ishikawa diagram), flowcharting, and value stream mapping to understand their processes and identify opportunities for improvement. The team developed a formula for calculating the costs for fit testing by analyzing the time involved, number of personnel, and product price. These costs were utilized to demonstrate the financial impact of standardization to each individual hospital and the organization. They also revised the policy and procedure documents for both respiratory protection and TB control.

One key element introduced to increase program efficiency was enhancing the TB risk assessment process and worksheet to assist management in the identification of who should be fit tested. The risk assessment process categorized departments and units into three priority levels for participation in the respiratory protection program: (1) department or units in which all staff whose duties are likely to place them at risk of occupational exposure to patients with confirmed or suspected respiratory pathogens should be fit tested (such as areas

with negative pressure ventilation rooms for airborne isolation, and staff who work with HVAC systems); (2) departments in which a core group of staff should be fit tested (such as housekeeping and laboratory areas), and (3) departments or units where employees have minimal risk of occupational exposure to confirmed or suspected respiratory pathogens and could receive fit testing on a just-in-time basis as needed for outbreaks of novel pathogens or emergencies (such as repairmen working in negative pressure rooms). Once department levels are identified, staff from the departments of infection prevention, environmental health and safety, and occupational health partner to complete the annual TB risk assessment.

Staff members from the environmental health and safety department serve as administrators of the respiratory protection program at the majority of the hospitals, working closely with the infection prevention personnel who manage the TB control plan. Working together, a train-the-trainer model for fit testing at BJC HealthCare was established.

The solution for improving the documentation included the development of an online database, accessible to all management personnel. Developed by a senior database analyst, the online program allows people managers to see the status of their direct reports. The online program feeds the information into the occupational health database, allowing the information to be stored, monitored, and reported. Reporting can be completed at the organizational, hospital, and department level to monitor fit testing compliance. Environmental health and safety staff monitor compliance and report to management when variances are identified. Before rolling out the database, several key managers provided feedback during a trial of the new online database. Training materials were developed to instruct managers on how to use the database for documentation purposes.

The actual fit testing and training process was evaluated and no changes to the process were identified. All hospitals have designated trainers and most adopted a train-the-trainer process. Annual training sessions are conducted for all trainers as a review. There are now checks and balances in place to ensure paperwork is completed correctly and approved prior to fit testing. Additionally, an annual timeline was developed and implemented for the organization to ensure that risk assessments, medical screenings and fit testing are completed.

Ironically, the H1N1 outbreak in 2009 slowed down the work of the team. In order to address the increased need for employee vaccination and associated patient care challenges, staff had to push back some of the milestone dates that had been established. Nevertheless, the outbreak raised the visibility and importance of the team's work and improved the confidence of the health organization regarding the ability to respond to future outbreaks.

Factors that contributed to success of the project included the use of the DMAIC approach of process improvement, development of best practices as well as project champions, and the direct support and involvement of executive leadership. An important benefit of implementing this initiative is substantial cost savings in the areas of supplies and time spent fit testing employees. For example, one hospital was able to decrease its annual fit testing costs by 50%. The formula used to calculate fit testing costs is provided below.

After three years, it is clear that this effort has successfully standardized the practices for respiratory protection programs both within and across hospitals in BJC HealthCare. Development of the new process has promoted a strong partnership between staff from the departments of environmental health and safety, infection prevention, and occupational health. The hospitals are confident that their program meets both the OSHA requirements and more importantly their own staff's respiratory protection needs, promoting a safe work environment.

Annual N95 Testing Cost	=	Count of Fit Tests	X	[	(	Staff Count	X	Standard Hourly Rate	X	Average Duration of fit test in hours	)	+	(	Average Number of respirators used per test	X	Average cost per respirator	)	]

Source: BJC HealthCare, St. Louis, MO. Used with permission.

Chapter 3: Training and Fit Testing Challenges and Strategies

Fit testing and training are essential components of an effective respiratory protection program. The Occupational Safety and Health Administration (OSHA) mandates that all employees required to wear tight-fitting respirators must be fit tested (after receiving medical clearance) prior to respirator use and annually thereafter.[1] A fit test is necessary to ensure that, when donned appropriately, the selected brand and size of respirator fits the face of the wearer to preclude inward leakage of the contaminant through the face seal.[2] Readers should refer to Appendix A of OSHA standard 29 CFR 1910.134 and exactly follow the fit test protocols for whatever type of fit test they choose.[1] In addition to fit testing, annual training for respirator users is also a requirement of OSHA.[1] For a variety of reasons (discussed below), it can be a challenge for hospitals to ensure that all staff who are required to wear respirators receive the necessary training and are fit tested in a manner that will ensure their protection from exposure to aerosol transmissible infectious diseases (ATDs) and other respiratory hazards. This chapter explores various issues and potential solutions for fit testing and training on respirator use as part of an effective respiratory protection program.

Respondents to the call for practices (described in Chapter 1) indicated that providing annual fit testing and training to a large and diverse workforce can be challenging. According to Susan Johnson of Vanderbilt University, "The sheer number of staff who must be fitted (> 8,000 annually) is a challenge." Healthcare clinical workers and ancillary hospital staff are extremely busy people, many of whom work a variety of shifts around the clock rather than traditional hours. While certain components of training and education may be available electronically, fit testing must be performed with the individual physically present. Many responders to the call for practices articulated how challenging it can be to reach all staff (including contractual staff and students) and coordinate scheduling for those who work off-shifts, nights, and weekends. "Our biggest challenge would be employees' schedules: night shift, weekends, prn [*pro re nata*—"as needed"] staff who work other jobs . . . it is difficult to get staff away from the floor to perform the fit test with our limited number of resources to perform the test" according to Connie Pritt, RN, Occupational Health at MedStar St. Mary's Hospital, Leonardtown, MD.

Photo courtesy of NIOSH/NPPTL

In addition to problems with scheduling logistics, many other training and fit testing challenges were reported in response to the call for practices and identified in the small-group discussions during a NIOSH annual stakeholder meeting. Staff resistance to training and/or resistance to wearing respirators, a general lack of understanding of respiratory risks, inadequate time available to conduct a proper fit test and to provide education, difficulty in getting staff away from the floor, uncertainty about who needs to be tested, and equipment and inventory challenges were among the many reported. Many of these challenges have also been reported in the relevant literature.[3] Fortunately, hospitals that responded to the inquiry also identified strategies and practices they have used to overcome such challenges.

3.1 Who Needs Fit Testing and Training?

Before determining the appropriate content of training on respirator use, hospitals must first determine who needs fit testing and training. For example, should hospitals fit test and train everyone, or only certain groups of at-risk staff? Determining who needs fit testing and training and how to prioritize training relevant to job classification and other categorizations is a very

important first step toward implementing an effective respiratory protection program. Identification of who needs fit testing and training is ultimately a hospital-level responsibility (OSHA 29 CFR 1910.134).

Issue: Who needs fit testing and training?

The first step in determining who needs fit testing and training is to perform 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.[2] Readers should refer to the Hospital Respiratory Protection Program Toolkit: Resources for Respirator Program Administrators (the National Toolkit) and other guidance documents for instructions on how to perform a hazard evaluation and how to determine an employee's potential risk for exposure.[2] Based on this hazard evaluation, hospitals must determine their own policies and procedures for the use of respiratory protection, which should in turn identify the particular staff that must receive fit testing and respiratory protection training. In addition to national and public health recommendations, however, other factors may influence the identification of staff that should be part of the respiratory protection program and who must therefore be fit tested and trained to wear respirators. Hospital demographics, engineering solutions, available resources, patient population, and staff characteristics are among the variables that may influence such a determination.

Some hospitals elect to fit test and train all staff, and some select a subset of staff; both approaches have advantages and disadvantages. The advantage to fit testing and training the entire staff is that it may allow employees to respond quickly if a novel pathogen appears. This broad approach reduces their risk of unprotected exposure, but it can be very time-consuming and costly.[4] Providing respirator training and fit testing to a subset of staff can mean decreased expenditure of time and resources, but it may leave some staff unprotected. If hospitals decide not to fit test certain staff, they must make sure these staff do not get into a situation where they might be exposed. All staff should be trained on potential risks so they are aware of situations in which a respirator would be necessary.

Photo courtesy of Moldex

The number and types of people included in your respiratory protection program should not impact the quality and thoroughness of training and fit testing activities. "While hospitals do need to prioritize who they need to train first, there shouldn't be a trade-off between getting staff fit tested and trained well. This isn't a dichotomous choice." (Melissa A. McDiarmid, MD, MPH, DABT, Technical Expert Panel Member, Technical Expert Conference Call, February 4, 2012)

Most hospitals determine which staff to include in their respiratory protection program based on their risk of exposure. Some examples of ways hospitals define inclusion criteria include the following:

- Anyone who has the possibility of interacting with a patient on airborne isolations. For example, at MedStar St. Mary's Hospital, this includes all clinical staff as well as patient registration, physical therapy, occupational therapy, occupational health, laboratory staff, and physicians. The philosophy at MedStar St. Mary's is that the patients' care should not be compromised due to an inability to enter a patient room because of possible exposure.
- According to job category (for example, all nurses and all respiratory therapists).
- According to specific departments or units (such as those units with negative pressure rooms) based on the type of patients they see.

Readers should refer to Case Study 3.2 at the end of this chapter for an example of how targeting specific staff for

Sidebar 3-1: Training Elements as Required by OSHA

Important training elements include:

- Why the respirator is necessary, including when it must be worn
- Why proper fit, usage, and maintenance are crucial to its effectiveness
- What the limitations and capabilities of the respirator are
- How to inspect, put on, remove, use and check the seal of the respirator (also called a "user seal check") [for tight-fitting respirators only]
- What the procedures are for storage and maintenance
- How to recognize medical signs and symptoms that may limit or prevent the safe, effective use of respirators
- The general requirements of the OSHA standard for respiratory protection standards (federal and state)
- How to identify and react to respirator malfunctions
- Which type of respirator is appropriate for use in emergencies (for example, chemical release)

Source: Occupational Safety & Health Administration. Occupational Safety and Health Standards on Respiratory Protection, 29 CFR 1910.134. [cited 2013 April 15]. Available from: https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=12716

inclusion in the respiratory protection program resulted in a more manageable program.

3.2 Content and Topics for Training and Education

The distinctions between training and education are not always clear, but education is considered to be broader, and not necessarily inclusive of a practical, hands-on approach usually associated with training.[5] Training refers to planned efforts to facilitate the learning of specific competencies. These competencies usually consist of specialized knowledge, skills, and behaviors needed for success in a particular environment.[6] Training is specific, has a definite goal, and usually refers to a show of proficiency with a desired skill or outcome.[7] Occupational health and safety training generally consists of instruction in recognition of hazards, safe work practices, proper use of personal protective equipment (PPE), and emergency procedures and preventive actions.[8] Health educators are also becoming increasingly aware of the importance and value of weaving improvement principles and methods into health education.[5] This chapter will discuss training and education together as a method to improve defined competencies related to respiratory protection. Hospitals are encouraged to incorporate general principles for education and healthcare improvement as they develop their safety and respiratory protection curriculum.[5] For an example of a comprehensive education program, please see http://rpp.aaohnacademy.org/.

Issue: What topics must be addressed in respiratory protection training and education?

Once hospitals have determined who needs fit testing, they must identify the specific content to cover in training and education. Due to time and resource constraints, it is important for those conducting the respiratory protection training and fit testing to maximize the limited time they do get with staff to ensure that the provided training and fit testing is adequate—not only to meet OSHA requirements (see Sidebar 3-1: Training Elements as Required by OSHA) but most importantly to ensure protection of staff.

At a minimum, hospitals should ensure that the training topics identified in Sidebar 3-1 are covered in their respiratory protection program training (see Appendix A: Resource Tables for training resources).

Issue: How should training and fit testing address the technical aspects of using a respirator?

Employees should be able to demonstrate knowledge of how to correctly inspect, don, and doff the respirator they will wear and, in the case of tight-fitting respirators, how to check the seal of the respirator.[2] Numerous resources and educational tools that address the technical aspects of using a respirator (including proper donning and doffing, user seal-checks, fit, storage, and maintenance of respirators) are available on the CDC website at http://www.cdc.gov/niosh/npptl/respusers.html. It

should be noted that an OSHA-accepted fit test protocol must be followed *exactly* as it is written in the standard (whether this is a qualitative test, a quantitative test, or another approved method).[1] Given that mandated protocols are in place for these technical aspects of respirator use and fit testing, the reader is encouraged to refer to these documents and resources to ensure that his or her own protocols meet established recommendations and that the information provided therein is a part of the respiratory protection training.

While ensuring an appropriate fit via proper fit testing is one critical part of training for healthcare workers, this is only the first step in assuring that staff are adequately protected. Respirators are frequently misused so that they provide little to no protection.[8] It is important to know when a respirator must be worn, which respirator to use for which hazards, and how to use it correctly, because a respirator does not provide protection if it is not used properly.[9] In the call for practices, several common challenges associated with respirator use and tolerance were reported. These challenges were also discussed during the 2012 annual NIOSH stakeholder meeting (see discussion in Chapter 1) and have been supported in the literature.[10]

Challenges associated with infrequent use of respirators. Health care differs from other industries in that respiratory personal protective equipment (PPE) may be used only rarely—in contrast to other professions, such as mining and manufacturing, which may require the use of respirators on a more frequent or daily basis. In health care, it is not always easy to identify or predict when a respirator will be needed. Infrequent use of respirators can cause staff to forget the make and model of respirator for which they were fit tested, as well as how to correctly don, doff, and store respirators. Furthermore, physical changes may have taken place in the employee since the last fit test (gaining or losing weight, the addition of facial hair, etc.) so the fit-tested respirator may no longer fit. In addition, being unaccustomed to wearing respirators may contribute to problems with respirator tolerability.[11]

Strategies to address common challenges. Many organizations reported challenges in using respirators and provided strategies to address these challenges:

- Improving comfort and fit in wearing respirators. Hospitals often provide multiple sizes/styles of respirators so staff can choose the most comfortable option prior to fit testing. Many also provide

Figure 3-1: Example of Respirator Reminder Card from AOHP

N95 Respirator Training and Fit Testing Verification

Facility:_____ **Date:**_____

Employee:_____
Has successfully passed a qualitative/quantitative fit test and completed training in the appropriate use, limitations and application of this respirator.

Manufacturer:_____

Model:_____ **Size:**_____

Trainer Signature:_____

AOHP alliance

Through the OSHA and AOHP Alliance, AOHP developed this card for informational purposes only. It does not necessarily reflect the official views of OSHA or the U.S. Department of Labor. 8/2009

Personal Protective Equipment (PPE) Safety Tips

Donning Instructions

- Wash hands
- Don PPE in proper order *(gown, mask/respirator, goggles/face shield, gloves)*
- **Always** perform a face seal check before entering room *(follow manufacturer's recommendations to check for leakage)*

Doffing/Removal Instructions

- Remove PPE in proper order *(gloves, goggles/face shield, gown, mask/respirator)*
- Dispose of PPE in designated container
- Wash hands

Note: *Annual fit testing is required to re-verify appropriate respirator fit*

Source: Association of Occupational Health Professionals in Healthcare [Internet]. © 2014 [cited 2014 June 2]. Free Publications. Available from: http://aohp.org/aohp/TOOLSFORYOURWORK/FreePublications.aspx

Photo courtesy of Bullard Safety

(loose-fitting) powered air-purifying respirators (PAPRs) for staff unable to be fitted or for those who cannot tolerate N95 filtering facepiece respirators (N95 respirators). "We have an open door policy in Employee Health for employees to try the [respirators] available in Central Supply to be sure they have the most comfortable and well-fitting [respirators] available to them."
(Dallas Medical Center, Dallas, TX)

- Reinforcing proper donning and doffing procedures. Hospitals reported posting signage or instructions on correct donning or doffing of respirators outside each negative pressure room, on units, or on electronic bulletin boards for easy reference. (For an example of a sign that can be posted outside a room please see: http://www.cdc.gov/niosh/docs/2010-131/pdfs/2010-131.pdf.)
- Facial hair. Some hospitals have (loose-fitting) PAPRs available for those who prefer not to shave for personal or religious reasons; others have mandated shaving as part of their dress code.
- Incorporating respirator reminder systems. Many organizations reported utilizing various types of tools to remind staff on which make/model they had been fit tested. These include stickers, cards, or pictures identifying the size, type, and style of respirator for the employee. Stickers can be placed in wallets or pockets or on identification or security badges for easy reference, and pictures of respirators can be distributed in handouts or outside of rooms.
- Some hospitals reported using only (loose-fitting) PAPRs instead of N95 respirators because they are easy to use, require no fit testing, and are potentially "greener," since hoods can be disinfected and reused.

Issue: How can administrators ensure that staff understand when to use a respirator and what risks are involved if they fail to do so?

Despite OSHA regulations[1] and guidance from the CDC,[12] the literature suggests that staff noncompliance with respiratory protection recommendations remains a problem[13,14] and that knowledge about PPE is insufficient.[3] While many hospitals have comprehensive policies and procedures in place outlining potential hazards and situations that require a respirator, ongoing education on these issues is vital. Employees must be trained on the specific risks at their hospital and must know not only when to use a respirator, but why.

As mentioned, health care differs from other industries in that respiratory PPE may be used infrequently, so ongoing education regarding when and for which situations hospital staff should wear a respirator is very important. It is also very important to understand how to recognize a patient who may have an ATD that has not yet been diagnosed or confirmed by the laboratory. This education should be done at least annually, but should also be reinforced during the year. In addition to formal training, hospitals can use a variety of education and reinforcement strategies to help staff recognize situations in which they need to wear a respirator so this information stays in the front of their minds.

Strategies to educate or remind staff about when to use a respirator include the following:

- Handouts or newsletters about communicable disease recognition distributed to staff or posted electronically
- Regular infection prevention in-service training, presentations, or webinars
- Daily calls from infection prevention
- Unit meetings
- Weekly floor safety rounds
- Signage, posters, color coding or screening tools outside of rooms or other points of entry to alert staff of the need for respiratory protection

Issue: How should training and education address respiratory protection in emergency situations?

As discussed in Chapters 2 and 4, the integration and coordination across multiple areas of the hospital

(infection prevention, safety, occupational health, emergency preparedness, and so on) are important elements within a respiratory protection program and should be highlighted in training. Training curricula should specify procedures for respiratory protection in emergency situations, as they may differ from normal protocols.

Hospital staff must be aware of procedures to ramp up fit testing in response to potential outbreaks, epidemics, or biohazards, and these procedures should be a topic covered in training. Readers should refer to the 2009 OSHA Guidance document, "Pandemic Influenza Preparedness and Response Guidance for Healthcare Workers and Healthcare Employees," available at https://www.osha.gov/Publications/OSHA_pandemic_health.pdf.

Experts recommend that training in the use of respirators for emergency response should occur well in advance of the need.[15] Just-in-time training is not considered effective for these situations if the information being presented is new, given that staff are already stressed and anxious and may have a difficult time comprehending and interpreting new and unfamiliar information.[16]

Several organizations responding to the call for practices described approaches to emergency preparedness training they have used to ensure staff are prepared in the event of a pandemic or other large-scale exposure to potentially hazardous respiratory agents. Reston Hospital Center is located in the metropolitan Washington, DC, area and is near Dulles International Airport where there are travelers from all around the world. This puts patients and staff at a higher-than-average risk for exposure to biologic infectious agents such as TB and to the possibility of an attack with a biologic weapon. Because the hospital has a large TB population, it has more than 27 negative pressure rooms. Due to these risks, Reston Hospital Center chooses to fit test and train all their employees on N95 respirators or (loose-fitting) PAPRs if staff were unable to wear an N95 respirator.

Reedsburg Area Medical Center (RAMC) uses PAPRs as their primary respirator; however, when the H1N1 pandemic arrived in 2009, the N95 respirator was made available for staff preferring to use this type of respirator. Because it is a critical access hospital (25 beds), RAMC was able to do a rapid education, training, and fit testing for staff. A small core of individuals are annually trained on the N95 respirator and they keep fit testing kits and just-in-time training materials throughout the hospital so staff can rapidly become retrained and fit tested with the N95 respirator should the need arise. (See Case Study 3.1: Reedsburg Area Medical Center for more information.)

3.3 Enhancing the Efficiency of Fit Testing and Training

Issue: How can fit testing, training, and education be operationalized in an efficient manner?

Annual fit testing and training and education requires considerable time and resources but can be operationalized in many different ways. Some hospitals elect to combine fit testing and training/education; others offer these separately. Some experts recommend separating the education process from the fit testing process to ensure that all the essential education topics are adequately covered. As was discussed in Chapter 2 with regard to program administration, there is no one-size-fits-all approach for fit testing and training/education.

Approaches to fit testing. There are three major approaches regarding fit testing: centralized (one department or individual conducts the fit testing); decentralized (using a train-the-trainer approach whereby specific units or departments do their own fit testing); and contracted (whereby equipment vendors or outside companies or consultants conduct the fit testing and/or training).

There are also many different methods hospitals can use to conduct fit testing and traning. Many organizations offer fit testing and training via large forums or in a "blitz" format, such as during annual safety or health fairs; others schedule individual appointments. Some hospitals provide one-on-one training; others provide group or team instruction. Hospitals must consider which method is most appropriate for their own organizations. Although more studies are needed to compare the effectiveness of group versus individualized training, one study suggests that group training is less expensive and equally effective.[17]

Photo courtesy of Vanderbilt Environmental Health and Safety

The methods for conducting fit testing and training may vary, but it is important to ensure that those conducting the fit testing and training have the appropriate level of expertise. While it is certainly acceptable to use a train-the-trainer model to delegate fit testing, having oversight by a competent person with technical knowledge about the fit testing protocol (such as an industrial hygienist) is recommended.[2]

Many factors can influence whether or not these methods will work in the specific organization, including organizational size; patient population; number of staff needing fit testing; and number, competency, and knowledge level of fit testers. In the call for practices, many hospitals identified challenges in reaching particular staff groups, particularly per diem or contracted staff and physicians. Training strategies may need to be adjusted for these groups.

Hospitals responding to the call for practices identified several strategies to improve the efficiency of fit testing, including the following:

- Offering fit testing in each unit, in break rooms, or other settings
- Training managers as back-up fit testers
- Providing opportunities on all shifts and during off-hours for respirator selection and fit testing
- Providing fit testing by appointment
- Organizing fit testing and training by month, such as by training each department during a certain month, training employees during their birth month, or offering training during the same month each year
- Contracting fit testing services through an outside vendor, respirator manufacturer, or other third party
- Pooling resources with other systemwide facilities

3.4 Evaluating and Improving the Effectiveness of Training

Issue: How can an employee's knowledge or competence after fit testing or training be immediately determined?

An important part of training and education is evaluation—that is, did the training or education increase knowledge and skills? Overall evaluation of a comprehensive respiratory protection program will be discussed in Chapter 4, but this section highlights different methods hospitals have used to provide training and to assess the immediate effect(s) of training on the employees' knowledge and/or expertise in using a respirator.

Responses to the call for practices identified several training evaluation methods:

- Using video or online technology that contains knowledge verifications (such as pre- and post-quizzes or tests)
- Observing and inspecting respirator use, including daily or monthly rounding and obtaining immediate feedback from staff
- Conducting competency-based skill laboratories on donning and doffing
- Utilizing surveys to determine educational needs and education effectiveness
- Using "secret shoppers" or covert observation of real-time users of respirators
- Using outside vendors or manufacturer-provided training and evaluation
- Enhancing evaluation methods by determining educational needs and content through an oversight group such as an education council

As an example, Norton Hospital in Louisville, KY, has a multidisciplinary education council that meets monthly. This group consists of representatives from nursing, respiratory therapy, rehabilitation, radiology, and other departments who come together to discuss any pertinent information that may affect educational needs (such as emerging pathogens, changes to isolation precautions,

and changes in pass rates for the education modules). The group discusses what is needed with regard to education (in-service training, changes in practice), and education is modified accordingly. (See Sidebar 3-2: Educational Strategies at Norton Hospital.)

3.5 Modifying Training According to Language and Education Needs

Issue: How should training be modified according to language and education needs?

Hospital staff comprise a diverse group of individuals with varying levels of education and different learning styles. Training strategies may need to be tailored for literacy levels, and provisions for those with limited English proficiency should also be considered.

For example, at Stormont-Vail HealthCare in Topeka, KS, the PAPR is their primary respirator. The PAPR training was developed with the goal of tailoring it to multiple learning types. The education uses a multimedia approach, including a DVD provided by the manufacturer, a PowerPoint presentation developed by employee health, handouts, and face-to-face education. At Norton Hospital in Louisville, KY, employee memos and materials are typically written at sixth-grade reading levels. For those who may continue to struggle, one-on-one conversation and reinforcement is available.

Strategies for providing education for those with limited English proficiency include written and oral education and training materials in different languages as well as interpreters. St. Mary's Hospital in Madison, WI, provides interpreters for Hmong- and Spanish-speaking employees to assist with training and fit testing. During the training, materials are not translated into other languages; rather, the interpreter sits with the employee and interprets the information for the employee and answers any questions the employee may have. St. Mary's also fit tests and trains all interpreters. Depending on the language needs of staff, hospitals may consider offering group training in some languages (such as Spanish) and providing training in other languages on an individual basis.

Sidebar 3-2: Educational Strategies at Norton Hospital

The hospital conducts routine safety training for all staff, which covers respiratory protection topics. The interactive course instructs through narratives and videos and then asks staff questions: they must answer 80% correctly in order to continue on with the rest of the online course. The required annual safety exam also has a survey attached to ascertain how staff feel about the training and to solicit suggestions. Staff are often surveyed regarding the effectiveness of education and educational needs by the Education Council. Employee health staff is also an effective resource for staff who have questions, as staff are guided through what process they must follow if a risk is identified.

Source: Norton Hospital, Louisville, KY. Used with permission.

3.6 Key Points for Chapter 3

- ✓ It is important to identify which staff need to be included in a respiratory protection program.
- ✓ Identifying staff at risk of exposure can help to reduce the number of employees included in the respiratory protection program and make the program more manageable.
- ✓ Hospitals can choose from a variety of approaches to increase the efficiency of fit testing and training.
- ✓ While adherence to regulatory standards and professional recommendations is extremely important, the ultimate goal for training, educating, and fit testing staff is to protect them from respiratory hazards.
- ✓ Hospitals should have a plan to address just-in-time training and fit testing for emergency situations such as a pandemic or disease outbreak.
- ✓ Hospitals should evaluate training and education to ensure that they cover required topic areas, meet the needs of their staff, and are effective.
- ✓ Hospitals should make accommodations for employees' language and literacy levels when providing fit testing, training, and education.

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Case Studies for Chapter 3

Case Study 3.1: Reedsburg Area Medical Center: A Critical Access Hospital Responsive to Internally and Externally Driven Demands

Reedsburg Area Medical Center (RAMC) is a 25-bed critical access hospital in central Wisconsin that serves a primarily stable rural population with minimal seasonal fluctuation or impact from tourism. Like many hospitals during the 1990s, Reedsburg used N95 respirators for patient care. However, the decision was made in 2005 to switch to the PAPR for reasons of cost and convenience. The infection preventionist and employee health nurse, together with leadership, determined that the hospital would be better served by routinely using PAPRs as their primary respirator. Specifically, the process of annual fit testing was consuming too many resources and several staff found wearing N95 respirators to be uncomfortable. So the organization first pilot tested then switched to (loose-fitting) PAPRs, which they initially found to be easier to use, train staff, and offered an increased level of safety.

In 2009, when the H1N1 outbreak occurred, the hospital needed to increase its respirator supply and decided to bring back N95 respirators with the associated fit testing and training activities. This decision was made at the request of staff, who expressed concerns that it took too long to put on and remove the PAPR. Because RAMC is a small hospital, they were able to do a rapid education, training, and fit test for staff using a train-the-trainer model and offered electronic training on their bulletin board system. Once the outbreak subsided, the hospital resumed using PAPRs as the respirator of choice.

However, RAMC wanted to maintain the just-in-time training and fit testing capability they put in place during 2009. So they continue to annually train a core group of individuals on the N95 respirator. The core group was selected because they demonstrated leadership and accountability in adhering to the rigors required for fit testing N95 respirators. The group includes nurses (acute care and nursing home locations), lab and radiology technicians, plus employee health staff. Kits are maintained for fit testing and retraining throughout the hospital which enables them to ramp up use of N95 respirators should the need arise. The infection preventionist is responsible for evaluating and improving the overall program. The infection preventionist receives ongoing feedback from staff, which she reports is “one of the many benefits of being a small facility.”

An example of the train-the-trainer N95 respirator fit test checklist appears in Case Study Figure 3-1, page 39.

Case Study Figure 3-1: Train-the-Trainer N95 Respirator Mask Fit Test Checklist

Reedsburg Area Medical Center
Organization Focused

TRAIN-THE-TRAINER
N95 RESPIRATOR MASK FIT TEST CHECKLIST

TRAINEE: _____

TRAINER: _____

TRAINING REQUIRES KNOWLEDGE AND UNDERSTANDING OF THE FOLLOWING:

- ❑ Location of Protocols/Procedures, Forms and videos (Organization Focused, Employee Health section.)
- ❑ Respirator Protection Protocol
- ❑ Respirator – Mask Fit Testing Procedure
- ❑ Respirator – Mask Medical Evaluation Questionnaire
- ❑ Respirator – Mask Fit Testing & Education Form
- ❑ Watch Fit Test video on Hospital Bulletin Board

RESPIRATOR FIT TEST EQUIPMENT:

- ❑ Respirators (masks)
- ❑ Equipment (nebulizer/hood) Assembly/Setup
- ❑ Bitrex Sensitivity Solution
- ❑ Bitrex Test Solution
- ❑ Equipment (nebulizer, hood) Cleanup
- ❑ Ordering Equipment/Supplies

RESPIRATOR MASK

Preliminary Screening Checks/Fit Test:

- ❑ Facial hair (presence of facial hair defers to PAPR)
- ❑ Eating, drinking (except H_2O), smoking, or gum chewing for 15 minutes prior to test
- ❑ Proper donning of mask
- ❑ Visual checks for gaps
- ❑ Instructs deep breathing to check for air leaks
- ❑ Instructs how to fit piece around nose if applicable
- ❑ Correctly performs sensitivity/fit test

INSTRUCTS EDUCATION COMPONENTS OF FIT TESTING:

- ❑ When to wear respirator
- ❑ Maintenance/storage
- ❑ When to dispose
- ❑ Obtaining new respirator
- ❑ Perform seal check with each donning of respirator
- ❑ When re-testing/re-fitting indicated
- ❑ Facial hair prevents seal

_____ is now certified to perform fit testing of respirator masks
(Name of trainee)
having met the following criteria: observed a minimum of 1 fit test and demonstrated a 1 successful fit test.

Name of Trainer & Date: _____

NEW: 2/05 **VERSION:** 1
DISTRIBUTION: Organization Focused Manual—Employee Health
kjk \ Respirator Train-the-Trainer Mask Fit Checklist

STORED IN
EMPLOYEE HEALTH FILE

Source: Reedsburg Area Medical Center, Reedsburg, WI. Used with permission.

Case Study 3.2: Mid-Atlantic Health Care Network Veterans Integrated Service Network (VISN-6): Taking a Regional Approach to Respiratory Protection Programs Within the Veterans Health Administration (VHA)

The Veterans Health Administration (VHA) operates the nation's largest integrated healthcare system, with more than 1,700 hospitals, clinics, and other healthcare facilities.* Within the VHA, Veterans Integrated Service Networks (VISNs) provide authoritative liaison between the Veterans Health Administration Central Office in Washington, DC, and the medical facilities in the regions. VHA leadership includes the Undersecretary for Health and the Deputy Undersecretary for Health Operations and Management, who are responsible for the performance in each of the 21 VISNs.†

The Mid-Atlantic Health Care Network is comprised of eight Veterans Administration Medical Centers (VAMCs) and 27 associated community-based outpatient clinics across North Carolina, Virginia, and West Virginia. The network employs more than 13,500 clinical and support staff members and utilizes about 4,000 volunteers to serve more than 320,000 veterans annually. Each of the eight VAMCs in the Mid-Atlantic Network has its own respiratory protection program with an RPP administrator, usually an industrial hygienist by training.

The Office of Inspector General (OIG) identified respiratory protection programs as a focus area for improvement in 2012. In response, in August 2012, the Department of Veterans Affairs issued an Information Letter from the Undersecretary for Health titled, "Respiratory Protection Used for Infectious Disease and Annual Fit Testing." The information letter addressed the management of respiratory protection programs as a follow-up to an OIG Combined Assessment Program. The OIG focus on respiratory protection programs was a driver for the Mid-Atlantic VISN-6 to review its respiratory protection programs and practices.

The respiratory protection programs were reviewed by the VISN industrial hygienist and the RPP administrator in each of the VAMCs during the annual workplace evaluation surveys to determine where improvements could be made. One of the areas that drew attention was the sheer number of employees included in the respiratory protection programs. The programs' enrollment skyrocketed as part of the 2009 pandemic influenza preparedness activities, but large numbers of enrollees remained in the program, which was difficult to sustain. Significant resources were being expended on fit testing and training, and higher numbers of enrollees made it very difficult to maintain regulatory compliance and ensure that annual fit testing and training were being done properly.

With the support of leadership, the safety department staff and infectious disease staff worked together to identify positions (based on job function, work location, and risk for exposure to respiratory hazards) that should be continuously enrolled in the respiratory protection program. It was decided that any patient care providers or other staff who work in areas that have airborne isolation rooms as well as all respiratory therapists need to be in the program. In addition, any nurses who go into these rooms on a rotating basis (float staff) need to be fit tested and trained. Using these parameters, one VAMC was able to reduce its number of enrolled staff from 625 (during the height of the pandemic flu) to a much more manageable 250. This decision was made at the medical-center level with the support of VISN safety staff and required communication and cooperation between infection control and the safety staff.

While each of the eight VAMCs has its own policies and processes, they all use a team approach to implementation of their respiratory protection programs. The teams, which include representation from employee health, safety staff, infection prevention and control, and the industrial hygienist, work collaboratively to address the different required components of the respiratory protection program. For instance, in one of the VAMCs, individuals are able to get medically screened by employee health, trained by the safety staff, and fit tested by the industrial hygienist in one 45-minute session. This col-

* U.S. Department of Veterans Affairs, Veterans Health Administration [cited 2013 Aug 26]. Available from: http://www.va.gov/

† U.S. Department of Veterans Affairs, Veterans Health Administration. VA Structure [cited 2013 Aug 26]. Available from: http://www.visn6.va.gov/about/vastructure.asp

laborative, one-stop-shopping type of training is offered in a variety of ways among the VAMCs. In one facility it is offered quarterly to all the different shifts; in another it is a week-long event where all employees are fit tested at one time, using what is frequently called a "blitz" approach. For those unable to attend a given session, one-on-one appointments are also provided. This approach has proven very successful in getting large numbers of staff cleared, trained, and fit tested in a timely fashion. Leadership support has always helped in encouraging staff, even if it is simply to announce training to the executive staff and supervisors.

VISN-6 places a lot of focus on who conducts the fit testing and training. While a train-the-trainer approach can be effective, it is important that the trainer has been evaluated in his or her ability to conduct the fit testing. The VISN safety and health team encourage trainers at all the VAMCs to comply with the ANSI/AIHA publication, which contains an evaluation form for respirator fit test operators. The VA also develops and publishes important guidance tools to which VAMCs can refer, such as the Industrial Hygiene Guidebook, VA Directives, and VA Information Letters. In the majority of the VAMCs, a trained industrial hygienist performs the fit testing with assistance from the safety staff, and even infection control on occasion.

The VAMCs in VISN-6 use a variety of tactics to ensure compliance with fit testing and training. Prior to the training and fit testing blitzes, leadership sends a message of support and encouragement to employees to complete their training. RPP administrators and industrial hygienists manage the roster of employees who have received training, and a monthly tracking report is provided to leadership as well as to the safety and the environment of care (EOC) committee. In order to ensure compliance, leadership at one of the medical centers prohibits direct patient care until that staff member completes his or her fit testing and training. Overall compliance is high, but there are pockets of individuals who remain a challenge, such as physicians who have privileges to practice, but are not full time employees of the VAMC, and residents who rotate at 90-day intervals. The industrial hygienist at each of the facilities observes employees donning and doffing their N95 respirators and the VISN-6 safety and health team conducts annual site visits to review the respiratory protection program policies and procedures as another layer of oversight.

While there are many commonalities in the implementation of their respiratory protection programs, one of the differences among the eight VAMCs is the use of the PAPR. In most of the VAMCs, (loose-fitting) PAPRs are utilized as the back-up respirator if an employee cannot pass a fit test for the N95 respirator. PAPRs are also the primary respiratory protection for the decontamination team or emergency responders. However, one of the VAMCs decided to rely primarily on the PAPR, and only use the N95 respirator as a backup. The industrial hygienist at this facility believed that the PAPR provided a higher level of employee protection than the N95 respirator and since staff do not need to be fit tested for the (loose-fitting) PAPR, it reduced the time necessary to train staff (although staff must still demonstrate competency). The industrial hygienist made the case for purchasing the PAPRs as emergency management funds were available and the VAMC had a large number of individuals in its program (over 500) who would necessitate a great deal of staff, time, and resources to fit test. Each employee enrolled in the respiratory protection program is provided his or her own hood, and PAPRs are located in the anteroom outside each of the negative pressure rooms. The PAPRs are checked daily by employees on the ward and monthly by a member of the safety staff to ensure battery life and that the filter cartridges are replaced each year. Feedback from staff has been positive; they felt it to be more comfortable and less time consuming than ensuring a proper fit on an N95 respirator every time they donned the respirator, especially since many do not use this type of PPE every day.

Overall, the Mid-Atlantic Health Care Network offers a good example of the administration and implementation of a number of individual respiratory protection programs under a larger umbrella of oversight. While many commonalities exist, there is still room for differences among the VAMCs in their approach to respiratory protection.

Chapter 4: Coordination and Program Evaluation

The respiratory protection program (RPP) administrator should establish mechanisms for effective communication and coordination with other departments and functions in the hospital. Examples of approaches used by hospitals to enhance coordination and communication include sharing compliance rates and measures of training effectiveness at interdisciplinary work group meetings and reporting overall program evaluation findings and quality improvement efforts to organizational leaders. Regardless of the particular approach, effective communication and coordination are key elements of a successful respiratory protection program.

4.1 Coordination with Planning for Emergency Preparedness and Other Noninfectious Hazards

Issue: How can communication, coordination, and efficiency be maximized for staff who may need to wear respirators for very different reasons?

Many hospitals are challenged by how to integrate training and fit testing for staff that may be exposed to infectious diseases with training and fit testing for staff that may need respiratory protection for emergency response or exposure to noninfectious hazards. The most common approach received in the call for practices was use of a multidisciplinary team. Teams typically include staff from departments such as nursing, employee health, infection prevention and control, emergency preparedness, laboratory, environmental health and safety, as well as supply chain management and sometimes vendors. Effective teams typically have diverse representation from stakeholders across different levels of authority and defined responsibilities for individual members. The team as a whole has a clear sense of purpose and specific goals to accomplish. Team leaders have strong change management, organizational, and interpersonal skills; leaders may rotate over time as appropriate. As described in Chapter 2, OSHA standards do not require that respiratory protection programs be led by a specific department, and there is often value in joint leadership by two or more departments or functions. Nevertheless, it is important to remember that OSHA requires that a hospital name a single RPP administrator with ultimate accountability for compliance.

Effective coordination begins with a clearly written respiratory protection program plan that addresses a wide range of hazards and staff accountabilities. The respiratory protection plan at Vanderbilt University Medical Center includes many different appendices. Each appendix has its own identified list of hazards that necessitate the use of respiratory protection, the specific respirators approved to address these hazards, the training that must be provided, and the medical surveillance that is required. The respiratory protection program addresses respirator use for workers using formaldehyde during laboratory tasks, workers coming into contact with infectious aerosols, and workers handling hazardous aerosolized pharmaceuticals, as well as those workers involved in patient decontamination.

An effective respiratory protection program must address the special needs of particular groups within the hospital who are at risk. Integration and coordination with staff who lead emergency preparedness activities is important because disasters can include exposure to infectious agents as well as noninfectious hazards (see Table 2-1: Examples of Biological, Chemical, and Radiological Hazards for which Healthcare Workers may Require the Use of Respirators). Staff who have been identified as first responders to the site of the emergency as well as those identified as first receivers at the facility where triage and care is first provided are required to use the most protective type of PAPRs, because their exposure may be to unknown substances (see Sidebar 4-1, page 43).[1] Therefore, staff designated as first responders/receivers require separate training. Regardless of how training is implemented, the needs of first responders and receivers should be addressed in the written respiratory protection program.

Photo courtesy of HCA (Hospital Corporation of America)

It is also important to remember that fully protecting high-risk workers from respiratory hazards often requires more than the use of a respirator. For example, Grady Health System, one of the largest public teaching hospitals in the United States, uses a variety of engineering and administrative controls to minimize employee exposure to hazardous chemicals. Grady also has a supplementary approach to ensuring that staff involved in emergency preparedness and response situations are knowledgeable about respirators and have access to the appropriate equipment. These methods are described in Case Study 4.1, which appears near the end of this chapter.

4.2 Evaluating Program Effectiveness

Issue: How should overall program effectiveness be evaluated?

The OSHA standard 29 CFR 1910.134 requires periodic evaluation of the implementation and effectiveness of the respiratory protection program. Though the standard requires that the program be evaluated regularly, it does not indicate that it be done within specific intervals (such as annually).[2] However, the Respirator Evaluation in Acute Care Hospitals (REACH) study findings (see Chapter 1) suggest that program evaluation is often not routinely done.[3]

Evaluation planning and obtaining staff feedback and data for metrics can be accomplished using a variety of approaches. The ultimate responsibility for the evaluation falls to the RPP administrator, but input from respirator users is required by OSHA. Some hospitals engage individual staff members, unit managers, department directors (such as those in occupational health or infection prevention and control), or existing multidisciplinary committees to assist in the implementation. For example, at Presbyterian Intercommunity Hospital, program evaluation is addressed during monthly pharmacy and therapeutics committee meetings. Staff

Sidebar 4-1: Example of Preparedness for Unknown Gas Exposures

Valley Regional Medical Center in Brownsville, TX, is located close to the Port of Brownsville, the only deep water port on the U.S. and Mexican Border. While at the Port of Brownsville, two workers were in the bilge of a ship when one of the men accidentally opened a compartment. Both men were overcome with bilge gas. The workers were evacuated and transported to Valley Regional Medical Center.

The staff at Valley Regional Medical Center had been alerted by the City of Brownsville Fire Department that two men were being transported to their ED and had been exposed to an unknown gas. The hospital staff donned appropriate personal protective equipment, including PAPRs, so they would be able to safely provide treatment to their patients. The patients were treated without incident and after resuscitation efforts ceased, the entire area and the personnel involved in treating the patients were decontaminated.

Fortunately, the respiratory protection and emergency management programs at Valley Regional Medical Center clearly outlined what to do in the event a patient was brought to the ED having been exposed to unknown hazardous gases. Staff had received training on the use of appropriate PPE and PAPRs for such a scenario. The PAPRs were charged and readily available and staff knew how to access them and how to use them appropriately. This example highlights how the incorporation of emergency preparedness into the medical center's respiratory protection program enabled staff at Valley Regional Medical Center to safely treat their patients while minimizing risk to themselves.

Source: Valley Regional Medical Center, Brownsville, TX. Used with permission.

from infection control, employee health, and respiratory therapy departments review the program as well. Employees can provide feedback during their staff meetings, partnership council meetings, or to employee health.

The evaluation should include observing practices where respirators are being used, as well as soliciting direct feedback from staff, particularly those likely to use respirators. This can be done by talking to staff one-on-one as well as during discussions at standing meetings. Many hospitals obtain feedback about the respiratory protection program from staff during the annual fit testing process by asking standardized questions of each person. Others hold small group discussions within work areas.

To assess compliance with the written program, evaluators often directly observe staff use of respirators on the units. Figure 4-1 on page 45 provides a sample checklist of items to consider when formally observing staff respirator use while caring for patients on airborne precautions.

The National Toolkit includes a helpful and detailed evaluation checklist with instructions to help ensure that the respiratory protection program evaluation is comprehensive.[1] One of the expectations for program evaluation includes ensuring that there is a way for staff to communicate general problems or ideas for improvement to the RPP administrator so that appropriate changes to the program will be considered. When the evaluation reveals opportunities for improvement, changes should be made to processes and policies to address deficiencies and ensure that actual practice is consistent with the policies in the written program.

The following examples of how and when hospitals collect information for the overall evaluation of the respiratory protection program were received during the call for practices:

- Annual audit, at time of training
- Standardized questions about the overall program at the time of fit testing
- Small-group testing and discussion by work area
- Walk-through rounds by management and/or infection prevention and control staff to spot check respirator and PPE usage for patients in respiratory isolation
- "Secret shoppers" to covertly observe if respirators are being used properly when indicated
- Incorporation of the evaluation into annual safety training
- Observation of donning and doffing during emergency preparedness drills
- When a staff person is potentially exposed to an airborne pathogen (for example, by caring for a patient in an airborne isolation room without wearing a respirator) and the incident is reported, occupational health staff investigate the root causes and improve practices as needed
- Use of incident or adverse event reporting systems to report situations or "near misses" (for example, when a respirator is not available or not functioning when needed)

Examples of quantitative metrics, also known as process and outcome measures, for assessing program effectiveness include the following:

Process Measures

- Percentage of staff included in the respiratory protection program who complete medical clearance, training, and annual fit testing
- Availability of appropriate PPE that meets staff needs (e.g., makes, models, and sizes of respirators)
- Timeliness of replenishment (e.g., cleaning and restocking of appropriate respirators)
- Percentage of PAPRs not functioning properly (e.g., those with dead batteries or faulty airflow)
- Percentage of staff fully compliant with proper donning and doffing techniques

Outcome Measures

- Counts or rates of staff who are exposed by not wearing respirators or incorrect use of respirators
- TB conversion rate (from a negative skin test to a positive)
- Employee days of lost work due to work-related respiratory illness
- Incidence of staff contracting an aerosol-transmissible disease

Figure 4-1: Sample Checklist of Items to Observe Regarding Respirator Use

Example of a Respiratory Protection Observation Checklist for Observing Staff Caring for Patients with Suspected or Confirmed Airborne Infectious Diseases

Date:_____Start time ____ End Time _____ **Observer:** _____
Location: _____ (e.g. med-surg unit, ED, ICU, room number)

Structural factors	**Healthcare worker 1**	**Healthcare worker 2 . . .**
Sign on door present to indicate airborne precautions required?	Y / N / NA	Y / N / NA
Respirators available?	Y / N / NA	Y / N / NA
Sink or hand rub available?	Y / N / NA	Y / N / NA
Waste receptacle available?	Y / N / NA	Y / N / NA
Process factors (respirator use, practice)		
Type of personnel (e.g. nurse, physician, RT etc.)		
Respirator used?	Y / N	Y / N
Type of respirator (e.g. N95 or PAPR)		
Respirator donned prior to entering room?	Y / N	Y / N
Proper hand hygiene performed before donning?	Y / N / NA	Y / N / NA
Respirator positioned correctly?	Y / N / NA	Y / N / NA
No sign of facial hair where respirator seals? (NA if loose-fitting PAPR is used)	Y / N / NA	Y / N / NA
Straps correctly placed?	Y / N / NA	Y / N / NA
Nose clip tightened after donning? (NA if model does not have nose clip)	Y / N / NA	Y / N / NA
Seal checked? (NA if PAPR is used)	Y / N / NA	Y / N / NA
Removed properly?	Y / N / NA	Y / N / NA
Disposed of respirator? If *no*, stored how?	Y / N / NA	Y / N / NA
Proper hand hygiene after use?	Y / N / NA	Y / N / NA
Additional notes		

Source: Adapted from: Harrison RM, Beckman S, Goldmacher S. Respiratory Use Evaluation in California Acute Care Hospitals Final Report. 2011 April 4.

It can be helpful to tailor the evaluation methods to the different components of the program. For example, New York University (NYU) Langone Medical Center uses different processes to evaluate the program's effectiveness for infectious diseases and emergency preparedness. The evaluation of respirator use for first responders and receivers is integrated into the incident evaluation process conducted by a multidisciplinary evaluation team. The team evaluates the exercise and compiles the information into an After Action Report. Lessons learned during the exercises were that staff occasionally forgot to turn on the respirator, or the filters were upside down, or the hose was positioned in a way it could malfunction (for example, if the hose on the PAPR becomes kinked). Staff also reported feeling uncertain as to whether they had appropriately donned the gear. As a result, the hospital designated staff whose primary responsibility was to perform safety checks on staff and equipment prior to entering the incident area. Since incorporating the "safety checkers" into their process, staff have reported feeling more confident that they are using the equipment appropriately.

To evaluate other aspects of the NYU Langone Medical Center respiratory protection program, representatives from occupational health, environmental health and safety, nursing and infection control conduct a biannual infection control risk assessment. This risk assessment assesses changes in the physical infrastructure, populations served and staffing, as well as surveillance data, emerging viruses, and evidence of nosocomial respiratory viral transmission.

Hospitals often use multiple methods and metrics to evaluate the respiratory protection program. The advantage of using multiple measures is that it provides a more robust assessment of the different components of the program. The results of the evaluation can be displayed in the form of a "dashboard" or "scorecard" so that senior leadership and oversight organizations can see how well the overall program is functioning at a glance. For example, at Capital Region Medical Center, they track exposures to communicable diseases and look for trends. If any trends are identified, actions plans are developed and implemented. They also track days lost to work-related illness and investigate any outbreaks. Examples of elements, methods and metrics that could be addressed in the overall evaluation are provided in Figure 4-2, page 47.

4.3 Closing Thoughts

The goal of this educational monograph was to (a) stimulate greater awareness of the importance and potential benefits of effective respiratory protection programs in hospitals, and (b) provide strategies to overcome common challenges associated with implementing respiratory protection programs. In response to the 2012 call for practices, hospitals shared a variety of challenges and solutions regarding management and implementation of their respiratory protection programs. Readers are welcome to contact the submitting organization for additional details about their activities and programs. The contact information is provided in Appendix C.

Implementation of the strategies and solutions described in this monograph will necessarily vary according to the goals and needs of each hospital. The application of a structured improvement process (as described in Chapter 2) is often a useful approach for setting goals, understanding current weaknesses and opportunities for improvement, implementing and evaluating the effectiveness of changes, and ensuring the gains are maintained.

Some common characteristics across many of the submitted practices relate to the following:

- The leaders and staff have established an organizational culture that values safety not only for patients but also for staff and visitors and all who enter.
- Leaders are aware of the value of the respiratory protection program and commit the resources needed to develop, implement, and maintain it.
- Staff across disciplines are engaged in the program, provide feedback to the program leaders, and receive feedback and regular communication about the program.
- Training and education about respiratory hazards and respiratory protection are provided on an ongoing basis.
- Reminders, observations, and real-time feedback helps to ensure continued awareness of the importance of respiratory protection.

Figure 4-2: Examples of Elements to Consider for Overall Evaluation of a Respiratory Protection Program

Domain	Items	Methods	Metrics
Compliance with annual requirements	• Training • Fit testing • Documentation completeness • Medical clearance	• Monthly or quarterly reports from electronic systems	• Percent of eligible staff who completed fit testing
Supply related	• Adequacy • Availability • Purchasing and replacement • Maintenance and repairs • Changing technologies	• Conduct inventory • Assess ease of access • Evaluate quality and functionality	• Ratio of number of respirators to staff at risk • Percent not available
Staff related	• Awareness of program • Knowledge of when to use, which hazards are relevant, which respirators fit, location of respirators • Technique for donning and doffing • Actual use in practice • Problems, concerns, opportunities to improve	• Pre and post training tests • Staff surveys • One-on-one interviews • Formal structured observation of staff PPE use when caring for patients on airborne precautions	• Percent of correct answers to tests • Proportion of staff correctly using PPE • TB conversion rates • Number of exposure incidents

In summary, a comprehensive respiratory protection program is important for both staff and patients. While there are challenges to implementing a respiratory protection program, this monograph, the National Toolkit and other resources are available to assist hospitals as they address the challenges. Sharing of effective and innovative practices will help others identify strategies for continual improvement of their respiratory protection programs. Improved programs will ultimately better protect the healthcare community from respiratory hazards.

4.4 Key Points for Chapter 4

✓ The RPP administrator should establish mechanisms for effective communication and coordination with other departments and functions in the hospital.

✓ Effective coordination begins with a clearly written respiratory protection program plan that addresses the range of respiratory hazards and staff accountabilities.

✓ The evaluation should include observing practices where care is being delivered as well as soliciting direct feedback from staff, particularly those most likely to use respirators.

✓ The National Toolkit includes a detailed evaluation checklist with instructions to help ensure the evaluation is comprehensive.

✓ It can be helpful to tailor the evaluation methods to the different components of the respiratory protection program and to use multiple methods to gather information as well as multiple metrics to assess program-related processes and outcomes.

✓ While there are challenges to implementing an effective respiratory protection program, it can be achieved. Sharing of strategies and practices across organizations can assist others in identifying and making improvements.

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Case Studies for Chapter 4

Case Study 4.1: Grady Health System: How a Comprehensive Respiratory Protection Program Can Minimize Exposure to a Wide Range of Hazards

Grady Memorial Hospital, one of the largest safety net hospitals in the United States, with 953 beds, a Level I trauma center and two medical school affiliations, has long been a leader in emergency management and response activities. The respiratory protection program is run jointly by Lori Wood, manager of the emergency management program and designated RPP administrator and Cynthia Alexander, director of Respiratory Care.

There are four departments within the hospital that require annual N95 respirator fit testing: respiratory therapy, microbiology, the respiratory isolation unit, and pulmonary function. Fit testing and training of staff likely to be exposed to respiratory hazards as part of clinical care is initially done by employee health staff as part of the pre-employment screening process. Employee health staff track adherence to the program and report information through the infection prevention and control committee. Individual staff compliance with the annual fit test is a condition of employment for those employees who require fit testing. For staff involved in emergency preparedness and response, the Grady respiratory protection program includes an annex to the hospital Emergency Management - All Hazards Emergency Operations Plan. There are two emergency management policies that address respiratory protection: the respiratory protection policy detailed in the emergency management plan and the emergency management PPE policy. Emergency management personnel train staff in the emergency department and in other support services departments who participate in the first receiver role of hospital decontamination. Oversight of the program occurs through senior leadership participation in two hospital committees: environment of care and emergency management.

The Grady decontamination program serves as a template for other first receiver acute care hospitals in the state. The program is taught by in-house trainers who have been certified through the comprehensive train-the-trainer program through the Healthcare Community Preparedness Program Emergency Preparedness and Response division of the Georgia Department of Public Health, which is funded by grants through the Assistant Secretary of Preparedness and Response (ASPR) and the state of Georgia Healthcare Preparedness Program. Grady has 26 full PAPR kits and 11 PAPR hoods for biohazard incidents. Prior to use, staff receive training through an eight-hour class taught by certified decontamination instructors. Evaluation of the appropriate use of respiratory protection for emergencies occurs during exercises and drills and is an integral part of after-action reports.

The Grady respiratory protection program protects workers from chemical respiratory hazards through the hierarchy of controls. Using respirators to keep employee exposure to hazardous gases and vapors within safe levels is considered to be the choice of last resort. The hospital prefers to utilize engineering controls and standardized work practices (such as monitoring of negative pressure isolation rooms, monitoring of air exchanges, monitoring of exhaust systems in areas of decontamination) to keep employee exposure to hazardous chemicals below the OSHA permissible exposure limits. As with many hospitals, construction and reconfiguration of spaces are ongoing challenges. For example, sometimes the hospital needs to repurpose areas not originally designed for procedures involving hazardous chemicals and/or products (e.g., exam rooms converted for endoscope high-level disinfectant reprocessing, or storage rooms used as soiled utility rooms). Grady addressed this challenge by establishing a space utilization policy, approved by the environment of care committee, that requires department leadership to submit a written request to facilities development staff prior to changing the utilization of any room or space to ensure that the area will meet heating, ventilation, and air conditioning (HVAC) design specifications for its new intended purpose.

One area where engineering controls are used involves staff who work with glutaraldehyde, a chemical for

high-level disinfection of medical devices and equipment. Products containing glutaraldehyde are slowly being reintroduced into hospitals. Even with controls including general dilution ventilation (10 room air changes per hour), as well as vapor control systems for the endoscope processors, it is still difficult to maintain compliance with threshold limits. To overcome the issue, Grady identified the need to build a centralized endoscope reprocessing facility that will meet HVAC design specifications for endoscope reprocessing. Grady will also be replacing the glutaraldehyde-based high-level disinfectant with another product containing hydrogen peroxide/peracetic acid that appears to be less toxic and has a lower vapor pressure.

Overall, the Grady Health System respiratory protection program serves as a notable example of why a comprehensive program for workers at a major medical center requires attention to the hierarchy of controls including the use of effective respiratory protection.

Case Study 4.2: The Texas Center for Infectious Disease: Maintaining Adherence in a High-Risk Setting

The Texas Center for Infectious Disease (TCID) is a freestanding inpatient facility dedicated to the treatment and elimination of tuberculosis (TB). TCID, located in San Antonio, began operation in 1953 as a large inpatient hospital for patients with TB. In 2011, a uniquely designed, 75-bed specialty hospital with integrated air quality and security systems was opened by the Texas Department of State Health Services on the original South San Antonio campus. The entire facility has been designed to prevent TB transmission and enhance the patient experience during a prolonged hospital stay (from six months to two years). It is currently the only freestanding inpatient TB treatment facility in the United States. TCID is also affiliated with two major academic medical centers: The University of Texas Health Science Center at Tyler and its Heartland National TB Center, and the University of Texas Health Science Center at San Antonio.

The mission of TCID is to provide high-quality medical care and opportunities for research and professional education for providers of patients with hard-to-treat TB and complicating conditions. Health care and diagnostic services are provided to all referred patients aged sixteen and older, including those who are unable to pay, as part of the Department of State Health Services (DSHS) system supporting preventive and treatment services. Eighty percent of admissions are voluntary, but TCID also supports court-ordered treatment.

Because of its unique patient population, TCID has sophisticated mechanical and environmental controls in place, including electronic security, surveillance, and communication systems. Each private room/bath is large and can be air-isolated to twelve changes per hour. Indicators at doors to anterooms and patient rooms notify staff about the air control status in each space and have an alarm that sounds if the negative air flow malfunctions or if doors are left open for more than 15 seconds. Fences, electronic key systems, and gate control access are also in place, enhancing the secure environment.

In addition to these controls, TCID rigorously reinforces staff respiratory protections. TCID employees are individually fit tested with elastomeric half-mask respirators.

Half Mask Elastomeric Respirator
Photo courtesy of Texas Center for Infectious Diseases

TCID selected the elastomeric respirator because they feel it provides a more reliable and comfortable fit, better respiratory protection, is cost efficient, and because it is less time consuming for fit testing. TCID recently switched to a new model of respirator, based on staff feedback that the facepiece on a previous model caused some facial bruising and was uncomfortable. The earlier model is now only used for employees with very large faces.

All persons in direct patient care receive an elastomeric half-mask respirator with N95 particulate filters. These cartridges are changed only when dirty, saturated with fluids, difficult to breathe through, or damaged.

Shoulder Bag
Photo courtesy of Texas Center for Infectious Diseases

Once a year the cartridges are changed during the employee annual mask fit testing. Staff also receives a shoulder carrying bag to keep the respirator with them at all times.

Staff from the cardiopulmonary (respiratory) department are available for respirator fit testing 7 days a week, 24 hours a day. Physicians, other contractors, and visitors to the facility must be fit tested and provided respirators by TCID. For individuals unable to wear half mask respirators, eight PAPRs are available on site, with four fully charged and ready to use at any given time.

Infection control and training specific to TCID policies and procedures as well as annual mask fit testing competence is provided to all new employees and on a continuing basis for existing staff to be sure all employees are fitted according to TCID policy and OSHA guidelines. The training includes negative and positive pressure seal checks, training on the proper use and wear of the particular respirator and advice on when to utilize the respirator, visual inspection, proper cleaning and storage, and any other concerns or questions that may arise.

Basic training and other courses are conducted by 1.5 FTE educators (RNs), the TCID-specific infection control practitioner, and environment of care specialists. Training materials are locally developed and provided by the Centers for Disease Control and Prevention (CDC). Because TCID patients are most often admitted with other infections in addition to TB, extensive training and precaution management is in place for other biologic infectious agents. TCID actively participates in the respiratory protection planning, implementation, and testing that is required of all of the Texas Department of State Health Services hospitals. TCID also participates in the emergency preparedness activities of the Southwest Texas Regional Advisory Council in San Antonio. These activities are designed to implement well-planned and coordinated regional disaster and emergency response systems. The campus-wide emergency management coordinator keeps 18 additional PAPRs available at two separate locations in the event of a disaster.

To evaluate their respiratory protection program, TCID tracks conversion to positive TB skin test or incidence of active TB or other airborne communicable infectious disease. Other activities include post-training and update testing, routine reinforcement of the use and importance of proper techniques, routine system and equipment checks, and regular sharing of the results in interdisciplinary meetings and workgroups. Staff are empowered to remind each other about PPE and encouraged to report any problems.

Persons who work at TCID understand the gravity of the types of diseases treated in their facility and the importance of careful attention to infection prevention and respiratory protection. TCID has not experienced an employee conversion in TB skin test in over a decade. TCID staff consistently leads in vaccinations, PPE use, demonstrations and checks, written testing of knowledge of infectious disease control techniques, and equipment use documentation. TCID has hosted visitors from around the world and has provided fit testing training and consulting for their affiliated academic medical centers, other area hospitals, and local public health and safety officers.

Based on evaluation and monitoring of measures, TCID reports a high level of compliance with their respiratory protection requirements. Many of the challenges facing other acute care hospitals when implementing their respiratory protection programs are not an issue at TCID. For example, there is no need to determine who should be fit tested and trained as all persons who must enter rooms that are in negative pressure are already fit tested and trained. They use their shoulder packs not only to carry their own respirators at all times, but also to keep other tools of their trade close at hand. There is no need to utilize respirator reminder systems. There has been no

Tools of the Trade
Photo courtesy of Texas Center for Infectious Diseases

need to institute incentives or consequences for failing to adhere to respiratory protection program policies; as a culture, the need for respiratory protection is well understood and everyone is invested in protecting themselves. It appears that when the threat is real and ongoing, staff will comply with protocols put in place for their own protection.

Glossary

Administrative controls—Practices and policies employed by an organization to limit an employee's exposure to a hazard.[1]

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.[2]

Aerosol transmissible disease (ATD) or aerosol transmissible disease pathogen—Any disease or pathogen requiring Airborne Precautions and/or Droplet Precautions.[2]

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.[2]

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.[2]

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.[2]

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. Types of respirators (e.g. PAPRs, N95s) differ in their assigned protection factor. For more information, refer to the National Toolkit.[2]

Droplet precautions—A category of Transmission-Based Precautions that CDC and HICPAC may recommend when Standard Precautions 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.[2]

Engineering controls—Used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection. The initial cost of engineering controls can be higher than the cost of administrative controls or personal protective equipment, but over the longer term, operating costs are frequently lower and, in some instances, can provide a cost savings in other areas of the process.[3]

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.[2]

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.[2]

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.[2]

Fit factor—A quantitative estimate of the fit of a particular respirator to a specific individual. It typically estimates the ratio of the concentration of a substance in ambient air to its concentration inside the respirator when worn.[2]

Fit test—The use of a protocol to qualitatively or quantitatively evaluate the fit of a respirator on an individual.[2]

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.[2]

Healthcare Infection Control Practices Advisory Committee (HICPAC)—An advisory committee assembled to provide advice and guidance to the CDC and the U.S. Department of Health and Human Services regarding the practice of infection control and strategies for surveillance, prevention, and control of healthcare-associated infections and antimicrobial resistance in United States health care 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.[2]

Half-mask elastomeric respirators—A respirator with a tight-fitting facepiece that covers the nose and mouth that has either replaceable filters or cartridges for removing contaminants, or disposable filtering facepiece respirators where the entire facepiece is made of filtering material. Elastomeric respirators are sometimes referred to as reusable respirators because the facepiece is cleaned and reused but the filter cartridges are discarded and replaced when they become unsuitable for further use.[4]

Healthcare personnel—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.[2]

Hierarchy of controls—A systematic approach to mitigating occupational hazards where control measures are evaluated and implemented in the following decreasing order of efficacy: (1) elimination, (2) substitution, (3) engineering controls, (4) administrative controls, and (5) personal protective equipment.[3]

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.[2]

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.[2]

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.[2]

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.[2]

N95 filtering facepiece 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). For the purposes of this monograph, the term "N95 respirator" refers to an N95 filtering facepiece respirator.[2]

Negative-pressure respirator (tight-fitting)—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.[2]

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.[2]

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. The choice of PAPRs depends in part on intended use. For more information on PAPRs, see the National Toolkit.[2]

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.[2]

Quantitative fit testing (QNFT)—An assessment of the adequacy of respirator fit by numerically measuring the amount of leakage into the respirator.[2]

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 the National Institute for Occupational Safety and Health (NIOSH) for the purpose for which they are used.[2]

Respiratory protection program administrator (RPP administrator) [also referred to as respirator program administrator (RPA)]—Individual designated to oversee a facility's respiratory protection program (RPP).[2]

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.[2]

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.[2]

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.[2]

References

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3. National Institute of Occupational Safety and Health [Internet]. [updated 2010 June 25; cited 2014 July 10]. Workplace Safety and Health Topics: Engineering Controls [about 2 screens]. Available from: http://www.cdc.gov/niosh/topics/engcontrols/
4. National Institute of Occupational Safety and Health, National Personal Protective Technology Laboratory [updated 2011 Aug 2; cited 2014 July 7]. Respirator Trusted-Source Information [about 2 screens]. Available from: http://www.cdc.gov/niosh/npptl/topics/respirators/disp_part/RespSource3training.html

Appendix A: Resource Tables

This document is organized into four categories:

Resource Table 1—Key Sources of Information for Respiratory Protection Programs (RPPs)

1A. Respiratory Protection Program Toolkits
- o Hospital Respiratory Protection Program Toolkit: Resources for Respirator Program Administrators (The National Toolkit)
- o Implementing Respiratory Protection Programs in Hospitals: A Guide for Respirator Program Administrators (California Toolkit)

1B. OSHA Standards on Respiratory Protection

Resource Table 2—Resources from the Occupational Health and Safety Administration (OSHA)

2A. OSHA Resources and Tools for Respiratory Protection Programs
2B. OSHA Information on Healthcare Worker Safety and Health
2C. OSHA Guidance on Emergency Preparedness and Respiratory Protection

Resource Table 3—Resources from the Centers for Disease Control and Prevention (CDC)

3A. National Institute for Occupational Safety and Health (CDC/NIOSH)—General Respiratory Protection
3B. NIOSH Information on Healthcare Worker Safety and Health Initiatives and other NIOSH-related initiatives
3C. CDC Guidance on Emergency Preparedness and Respiratory Protection
3D. CDC/Infectious Disease

Resource Table 4—Additional Resources

4A. Professional Associations
4B. Institute of Medicine (IOM)
4C. Miscellaneous

NOTE: Please refer to the main websites for updated information that may not be available at the time of publication:

- http://www.cdc.gov/niosh/npptl/
- https://www.osha.gov/
- http://www.cdc.gov/niosh/
- http://www.cdc.gov/

Resource Table 1—Key Sources of Information for Respiratory Protection Programs (RPPs)

1A. Respiratory Protection Program Toolkits	
Hospital Respiratory Protection Program Toolkit: Resources for Respirator Program Administrators (The National Toolkit) (May 2015) https://www.osha.gov/SLTC/respiratoryprotection/guidance.html	This toolkit was developed to provide hospitals with a useful tool for developing and implementing effective respiratory protection programs, with an emphasis on protecting healthcare workers from aerosol transmissible diseases (ATDs). The body and appendices of the toolkit include links to references, resources, and electronic tools such as templates, sample forms, and educational materials. Topics in the guide include the following: • Why Hospitals Need a Respiratory Protection Program • Types of Respiratory Protection • Developing a Respiratory Protection Program • Clinical Syndromes or Conditions Warranting Empiric Transmission-Based Precautions Pending Confirmation of Diagnosis • OSHA Assigned Protection Factors • References, Resources, and Tools • Respiratory Protection Program Evaluation Checklist & Instructions for Use
California Department of Public Health—Toolkit for Respirator Program Administrators http://www.cdph.ca.gov/programs/ohb/Pages/RespToolkit.aspx Implementing Respiratory Protection Programs in Hospitals: A Guide for Respirator Program Administrators (May 2012) http://www.cdph.ca.gov/programs/ohb/Documents/HCResp-CARPPGuide.pdf	The Respirator Program Toolkit was designed with funding from the NIOSH National Personal Protective Technology Laboratory and in collaboration with several partners. It was created to support California hospital respirator program administrators, particularly those without formal education in workplace health and safety. This document is intended to be a guide for respirator program administrators, as well as provide related tools and resources. The guide covers key requirements of the Cal/OSHA Respiratory Protection and Aerosol Transmissible Diseases standards, guidance on developing and evaluating a respiratory protection program, and information on the selection and use of respirators. The tools and resources were developed and/or compiled by California Department of Public Health and are available through links within the guide itself. Topics in the guide include the following: • Why Do Hospitals Need a Respiratory Protection Program? • Understanding Respiratory Protection • Developing a Respiratory Protection Program • Useful Web Links • Respiratory Protection Program Evaluation Checklist & Instructions for Use • Respirator Selection Guide for Aerosol Transmissible Diseases **Tools and Resources** • Written Respiratory Protection Program Template for Hospitals (Microsoft Word format) – customizable for your hospital's program • Respiratory Protection Program Evaluation Checklist & Instructions for Use (PDF) – help to ensure your program's effectiveness • Respirator Selection Guide for Aerosol Transmissible Diseases (PDF) – a 2-page quick reference • General respiratory protection resources – compiled by CDPH • Respiratory protection resources for health care – compiled by CDPH

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Resource Table 1—Key Sources of Information for Respiratory Protection Programs (RPPs) (continued)

1B. OSHA Standards on Respiratory Protection	
29 CFR 1910.132 General Requirements for Use of Personal Protection Equipment https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9777	The OSHA Personal Protective Equipment standard (29 CFR 1910.132) requires employers to assess the workplace to determine if hazards necessitating the use of respiratory protection (and other PPE) are needed to protect employees.
29 CFR 1910.134 Respiratory Protection Standard on Personal Protection Equipment https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=12716	The OSHA Respiratory Protection standard (29 CFR 1910.134) requires employers to establish and maintain a respiratory protection program to protect their respirator-wearing employees.

Resource Table 2—Resources from the Occupational Health and Safety Administration (OSHA)

2A. OSHA Resources and Tools for Respiratory Protection Programs	
Respiratory Protection http://www.osha.gov/SLTC/respiratoryprotection/index.html	This webpage provides information on what respirators are, how they work, and what is needed for a respirator to provide protection.
Hospital eTool, Healthcare Wide Hazards, Tuberculosis http://www.osha.gov/SLTC/etools/hospital/hazards/tb/tb.html#RespiratoryProtection	Potential hazards to respiratory protection as well as possible solutions.
Respiratory Protection eTool http://www.osha.gov/SLTC/etools/respiratory/index.html	This eTool provides instruction on the proper selection of respiratory protection and the development of change schedules for gas/vapor cartridges, as well as providing help with compliance with the OSHA respirator standard.
Respiratory Protection Training and Reference Materials Library http://www.osha.gov/dte/library/materials_library.html#respiratoryprotection	OSHA's Office of Training and Education has prepared the following outreach training materials for OSHA's respirator standard: • PowerPoint presentation of 29 CFR 1910.134 • Major Requirements of 29 CFR 1910.134 • Frequently Asked Questions Links to additional resources for respiratory protection are also given.
OSHA Bulletin: General Respiratory Protections Guidance for Employers and Workers – 2011. http://www.osha.gov/dts/shib/respiratory_protection_bulletin_2011.html	The information in this bulletin provides basic information to workers and employers who may find themselves using respiratory protection for the first time.
OSHA Quick Card: "Protect Yourself Respirators" http://www.osha.gov/OshDoc/data_Hurricane_Facts/respirators.pdf	This is a quick reference card that lists the different types of respirators and the appropriate situations in which they should be used.
OSHA Respiratory Protection Videos https://www.osha.gov/SLTC/respiratoryprotection/training_videos.html#video	This page contains links to a variety of training videos related to respiratory protection. Topics include fit testing, medical evaluations, respiratory protection in general industry, respirator types, voluntary use of respirators, respiratory protection in construction, training requirements, respiratory protection for healthcare workers, the differences between respirators and surgical masks, donning and doffing, counterfeit respirators, maintenance and care, and the OSHA Respiratory Protection Standard (29 CFR 1910.134). Many are offered in both English and Spanish.

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Resource Table 2—Resources from the Occupational Health and Safety Administration (OSHA) (continued)

2A. OSHA Resources and Tools for Respiratory Protection Programs (continued)	
Training Video The Difference Between Respirators and Surgical Masks https://www.osha.gov/SLTC/respiratoryprotection/training_videos.html	Informational video on when surgical masks and respirators should be used and their functional differences.
OSHA Fact Sheet Respiratory Infection Control: Respirators Versus Surgical Masks http://www.osha.gov/Publications/respirators-vs-surgicalmasks-factsheet.html	This fact sheet by OSHA describes in detail when a respirator should be used rather than a surgical mask.
Training Video Respirator Safety: Donning and Doffing and User Seal Checks https://www.osha.gov/SLTC/respiratoryprotection/training_videos.html	This training video describes the basic instructions of wearing a respirator and discusses important related terms and definitions.
Small Entity Compliance Guide for the Respiratory Protection Standard https://www.osha.gov/Publications/3384small-entity-for-respiratory-protection-standard-rev.pdf	This document is intended to provide relevant information to employers and employees in determining whether respirators are needed and, if so, how the respirators should be selected and used. This publication does not replace the official Respiratory Protection standard (29 CFR 1910.134).
2B. OSHA Information on Healthcare Worker Safety and Health	
OSHA Fact Sheets on Safety and Health Program Management OSHA has published voluntary management guidelines (Jan 16, 1989, 390403916 Federal Register) to help implement safety and health programs. http://www.osha.gov/SLTC/etools/safetyhealth/mod4_factsheets.html	Series of fact sheets designed to supplement the voluntary guidelines (Federal Register Jan. 26, 1989, 3904-3916) related to implementing a safety and health program. These illustrate the basic components of a comprehensive safety and health program.

(Continued on page 61)

Resource Table 2—Resources from the Occupational Health and Safety Administration (OSHA) (continued)

2B. OSHA Information on Healthcare Worker Safety and Health (continued)	
OSHA educational web resource on preventing work-related injuries among hospital workers http://www.osha.gov/dsg/hospitals	This toolkit was released in January 2014. It includes a suite of resources to help hospitals prevent worker injuries, assess workplace safety needs, enhance safe patient handling programs, and implement safety and health management systems. The materials include fact books, self-assessments, and best practice guides. The toolkit includes a table that shows how the core elements of a safety and health management system align with Joint Commission standards for hospital accreditation. Finally, at the heart of these new materials are real life lessons from high-performing hospitals that have implemented best practices to reduce workplace injuries while also improving patient safety.
Safety and Health Topics: Healthcare https://www.osha.gov/SLTC/healthcarefacilities/index.html	A webpage portal covering a variety of issues: • Culture of Safety • Infectious Diseases • Safe Patient Handling • Workplace Violence • Other Hazards • Standards/Enforcement
Safety and Health Management Systems and Joint Commission Standards https://www.osha.gov/dsg/hospitals/documents/2.2_SHMS-JCAHO_comparison_508.pdf	Provides comparisons with Joint Commission standards according to the six core elements of a safety and health management system: management leadership, employee participation, worksite analysis, hazard prevention and control, safety and health training, and annual evaluation.
2C. OSHA Guidance on Emergency Preparedness and Respiratory Protection	
Pandemic Influenza Preparedness and Response Guidance for Healthcare Workers and Healthcare Employers – 2007 http://www.osha.gov/Publications/3328-05-2007-English.html	The goal of this document is to help healthcare workers and employers prepare for and respond to an influenza pandemic. The document also contains appendices that provide pandemic planners with samples of infection control plans, examples of practical pandemic planning tools, and additional technical information. Topic areas include Internet resources, communication tools, sample infection control programs, self-triage and home care resources, diagnosis and treatment of staff during a pandemic, planning and supply checklists, and risk communication. This educational material has been provided for informational purposes only and should be used in conjunction with the entire document in order to ensure that healthcare workers are adequately protected during a pandemic. OSHA does not recommend one option over the many effective alternatives that exist.

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Resource Table 2—Resources from the Occupational Health and Safety Administration (OSHA) (continued)

2C. OSHA Guidance on Emergency Preparedness and Respiratory Protection (continued)	
Frequently Asked Questions on Pandemic Influenza Preparedness and Response Guidance for Healthcare Workers and Healthcare Employers http://www.osha.gov/SLTC/pandemicinfluenza/pandemic_health.html	As the title suggests, this document provides general information regarding OSHA's *Pandemic Influenza Preparedness and Response Guidance for Healthcare Workers and Healthcare Employers* (OSHA Publication 3328) and links to additional resources.
Preparing Workplaces for an Influenza Pandemic (2009) http://www.osha.gov/Publications/OSHA3327pandemic.pdf	This document serves as a guide to the OSHA Pandemic standard (3327-05R 2009) as well as a guide to help businesses and industries plan ahead to help minimize a pandemic's impact.
Report Pandemic Influenza Preparedness and Response Guidance for Healthcare Workers and Healthcare Employers. U.S. Department of Labor. OSHA3328-05R. 2009. https://www.osha.gov/Publications/3328-05-2007-English.html	The document also contains appendices which provide pandemic planners with samples of infection control plans, examples of practical pandemic planning tools and additional technical information. Topic areas include Internet resources, communication tools, sample infection control programs, self-triage and home care resources, diagnosis and treatment of staff during a pandemic, planning and supply checklists and risk communication.
OSHA Best Practices for Hospital-Based First Receivers of Victims from Mass Casualty Incidents Involving the Release of Hazardous Substances – 2005. http://www.osha.gov/dts/osta/bestpractices/html/hospital_firstreceivers.html	This best practices document: 1) provides information to assist hospitals in selecting personal protective equipment (PPE) based on current interpretations of OSHA standards, published literature, current hospital practices, stakeholder input, and the practical limitations of currently available respiratory protective devices, and 2) consolidates OSHA standards and interpretations on training needs of first receivers. These best practices build on health and safety programs that hospitals already should have in place under existing OSHA regulations.
OSHA Quick Card: Protect Yourself Pandemic Flu Respiratory Protection http://www.osha.gov/Publications/protect-yourself-pandemic-respiratory.html	Short reference guide on who needs to wear a respirator during a pandemic.
OSHA Safety and Health Topics – Webpage Ebola https://www.osha.gov/SLTC/ebola/	This webpage provides information and resources related to Ebola and includes employer responsibilities and workers' rights.

Resource Table 3—Resources from the Centers for Disease Control and Prevention (CDC)

3A. National Institute for Occupational Safety and Health (CDC/NIOSH)—General Respiratory Protection	
REACH I Initiative (Overview) http://www.cdc.gov/niosh/npptl/respusers.html Publication Beckman S, Materna B, Goldmacher S, Zipprich J, D'Alessandro M, Novak D, Harrison R. Evaluation of respiratory protection programs and practices in California hospitals during the 2009–2010 H1N1 influenza pandemic. Am J Infect Control. 2013 Nov;41(11):1024–1031.	The Respirator Evaluation in Acute Care Hospitals (REACH) Study assessed the usage of respiratory protection for influenza exposure among healthcare workers in 16 California hospitals during the H1N1 influenza outbreak. 204 healthcare workers participated in this study and came from a wide range of clinical specialties, including emergency care, critical care, and pediatrics. Findings from REACH I served as an indicator of: 1) the extent to which hospitals in California have implemented required elements of a respiratory protection program for influenza; and 2) the usage of personal respiratory protection for influenza exposure among California healthcare workers. A paper summarizing this work can be found at the reference listed.
REACH Intervention and Evaluation http://www.cdc.gov/niosh/npptl/respusers.html	The purpose of this project was to extend and build upon the work previously completed under REACH I by examining the effectiveness of various interventions for improving respiratory protection programs in California acute care facilities. This project identified and evaluated effective interventions and best practices to strengthen California hospitals' respiratory protection programs and reinforce healthcare workers' proper use of respiratory protection. A toolkit of effective strategies was developed and tested in 14 California hospitals (see Implementing Respiratory Protection Programs in Hospitals: A Guide for Respirator Program Administrators in Resource Table 1A: Respiratory Protection Program Toolkits).
REACH II Initiative (Overview) http://www.cdc.gov/niosh/npptl/respusers.html Publications Peterson K, Novak D, Stradtman L, Wilson D, Couzens L. Hospital respiratory protection practices in 6 U.S. states: A public health evaluation study. Am J Infect Control. 2015 Jan 1;43(1):63-71. Hines L, Rees E, Pavelchak N. Respiratory protection policies and practices among the health care workforce exposed to influenza in New York State: evaluating emergency preparedness for the next pandemic. Am J Infect Control. 2014 Mar;42(3):240-5.	The REACH II study expanded upon REACH I to evaluate hospitals' written respiratory protection programs, as well as assess healthcare workers' use of respiratory protection for influenza and aerosol-transmissible exposures in key major regions of the United States (Northeast, Southeast, Midwest, Southwest, and West). The first article reports findings from a multistate assessment of hospitals' adherence to the Occupational Safety and Health Administration's respiratory protection program (RPP) requirements and the Centers for Disease Control and Prevention's infection control guidance. The second article summarizes findings from New York state.

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Resource Table 3—Resources from the Centers for Disease Control and Prevention (CDC) (continued)

Respirator Trusted-Source Information Page http://www.cdc.gov/niosh/npptl/topics/respirators/disp_part/RespSource.html	This webpage provides information on the different types of respirators, how to identify approved models and outlets for purchase, a listing of all NIOSH-approved and FDA-cleared surgical N95 respirators, a listing of recently revoked respirator approvals, and relevant User Notices. It also contains information on how to implement the use of respirators in the workplace and use them appropriately, and includes commonly asked questions and answers (fact sheets), respirator myths, the science of respirator function and performance, and respiratory protective devices not approved by NIOSH.
Workplace Safety and Health Topics – Respirators http://www.cdc.gov/niosh/topics/respirators	Various links and resources regarding respirators (H1N1 resources, NIOSH Fact Sheets and other publications, etc.).
Publication NIOSH Respirator Selection Logic http://www.cdc.gov/niosh/docs/2005-100/pdfs/2005-100.pdf	The purpose of this document is to provide guidance to respirator program administrators on respirator selection that incorporates the changes necessitated by the revisions to the respirator use and certification regulations and changes in the NIOSH policy.
Presentation Respiratory Protection: How to Best Protect from Workplace Exposures (August 27, 2013) Presenter: Debra A. Novak, DSN, RN Slides: http://www.public-health.uiowa.edu/heartland/ce/file.asp?ID=462	This presentation aimed to help healthcare professionals: • Understand recent clinical events and related research findings evidencing marginal compliance with recommended proper use of respiratory personal protective equipment (PPE). • Identify suggested strategies to reinforce healthcare workers' proper use of respiratory protection.
Presentation Debunking the Myths of N95 Respirator Use (September 5, 2013) Presenters: Roland BerryAnn Deputy Director, NPPTL Pat Wiltanger Physical Scientist, NPPTL http://www.cdc.gov/niosh/npptl/resources/pressrel/letters/lttr-09052013.html	This presentation aimed to do the following: • To expose the fallacies behind the myths of N95 respirator use by presenting the science behind the facts. • To encourage learning environments where myths no longer have a place in the culture of the workplace, and the facts about N95 use are clearly presented to workers.

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Resource Table 3—Resources from the Centers for Disease Control and Prevention (CDC) (continued)

3A. National Institute for Occupational Safety and Health (CDC/NIOSH)—General Respiratory Protection (continued)	
2013 and 2014 NIOSH Stakeholder Conferences http://www.cdc.gov/niosh/npptl/meetings.html	Links to NPPTL-sponsored stakeholder meetings, webinars, and conferences. Stakeholder meetings were an opportunity to exchange knowledge and ideas between professionals, policy makers, and manufacturers involved in the field of personal protective equipment for healthcare workers.
NIOSH Science Blog: A Guide to N95 Resources http://blogs.cdc.gov/niosh-science-blog/2013/09/05/n95-day-2013/ N95 Respirators and Surgical Masks http://blogs.cdc.gov/niosh-science-blog/2009/10/14/n95/ Catching the Flu: NIOSH Research on Airborne Influenza Transmission http://blogs.cdc.gov/niosh-science-blog/2013/01/15/catchingtheflu/ REACH II Study: http://blogs.cdc.gov/niosh-science-blog/2014/06/26/reach/	The NIOSH Science Blog provides an opportunity to discuss ideas on various workplace safety and health topics with leading researchers from NIOSH.
TB Respiratory Protection Program In Health Care Facilities - Administrator's Guide http://www.cdc.gov/niosh/docs/99-143/	This manual is designed to serve as a practical guide for those individuals responsible for initiating and running a TB respiratory protection program in healthcare facilities.
Video: "Efficacy of Face Shields Against Cough Aerosol Droplets from a Cough Simulator" https://www.youtube.com/watch?v=eGONzm3vdul	NIOSH Researcher Bill Lindsley discusses his research surrounding face shields and cough aerosol droplets. The video summarizes research found in the article entitled "Efficacy of Face Shields Against Cough Aerosol Droplets from a Cough Simulator" published in Journal of Occupational and Environmental Hygiene (Volume 11, Issue 8, 2014).
Video: "What it Means to be NIOSH-Approved: A look into N95 Certification Testing" http://www.youtube.com/watch?v=-sY47zdE7YA&feature=youtu.be	This video is a quick look into the NIOSH respirator approval laboratory, highlighting the equipment and process for certifying N95 respirators.
Video: "Respirator Certification - As Vital as the Air We Breathe" http://www.youtube.com/watch?v=Pj9P-NNYgmw	An overview of the NIOSH respirator certification process.

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Resource Table 3—Resources from the Centers for Disease Control and Prevention (CDC) (continued)

3A. National Institute for Occupational Safety and Health (CDC/NIOSH)—General Respiratory Protection (continued)	
Know it's NIOSH: Respirator Awareness: Your Health May Depend On It - Personal Protective Equipment for Healthcare Workers http://www.cdc.gov/NIOSH/docs/2013-138/pdfs/2013-138.pdf	Short informational piece on the importance of respirators and respiratory protective devices, as well as NIOSH-approved respirators.
Respirator Trusted-Source Information http://www.cdc.gov/niosh/npptl/topics/respirators/disp_part/RespSource.html	This page provides information on the different types of respirators, how to identify approved models and outlets for purchase, a listing of all NIOSH-approved and FDA-cleared surgical N95 respirators, and a listing of recently revoked respirator approvals and relevant User Notices. It also contains information on how to implement the use of respirators in the workplace and use them appropriately, and includes FAQ fact sheets, respirator myths, the science of respirator function and performance, and respiratory protective devices not approved by NIOSH.
3B. NIOSH Information on Healthcare Worker Safety and Health Initiatives and other NIOSH-related initiatives	
Report: National Occupational Research Agenda (NORA) State of the Sector: Healthcare and Social Assistance. Identification of Research Opportunities for the Next Decade of NORA. DHHS (NIOSH) Publication No. 2009-139. http://www.cdc.gov/niosh/docs/2009-139/	Section on Infectious Hazards goes into the importance of PPE usage (such as respirators) during an influenza pandemic.
Publication Personal Protective Equipment for Health Care Workers Who Work with Hazardous Drugs http://www.cdc.gov/niosh/docs/wp-solutions/2009-106/ (Spanish) http://www.cdc.gov/spanish/niosh/docs/wp-solutions/2009-106_sp/	NIOSH PPE recommendations for workers who handle hazardous drugs in the workplace.
Publication NIOSH List of Antineoplastic and Other Hazardous Drugs in Healthcare Settings, 2014 http://www.cdc.gov/niosh/docs/2014-138/	In Appendix A of the NIOSH Alert: Preventing Occupational Exposures to Antineoplastic and Other Hazardous Drugs in Health Care Settings, NIOSH identified a sample list of major hazardous drugs. The list was compiled from information provided by four institutions that have generated lists of hazardous drugs for their respective facilities and by the Pharmaceutical Research and Manufacturers of America (PhRMA). The 2004 list was updated in 2010 and 2012; this update adds 27 drugs to the 2012 list. In addition, a new format has been developed for the list of hazardous drugs, as described in the link.

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Resource Table 3—Resources from the Centers for Disease Control and Prevention (CDC) (continued)

3B. NIOSH Information on Healthcare Worker Safety and Health Initiatives and other NIOSH-related initiatives (continued)	
Publication Preventing Occupational Exposure to Antineoplastic and Other Hazardous Drugs in Health Care Settings http://www.cdc.gov/niosh/docs/2004-165/ (Spanish summary) http://www.cdc.gov/spanish/niosh/docs/2004-165_sp/	The purpose of this alert is to increase awareness among health care workers and their employers about the health risks posed by working with hazardous drugs and to provide them with measures for protecting their health. Healthcare workers who prepare or administer hazardous drugs or who work in areas where these drugs are used may be exposed to these agents in the air or on work surfaces, contaminated clothing, medical equipment, patient excreta, and other surfaces. This alert applies to all workers who handle hazardous drugs (for example, pharmacy and nursing personnel, physicians, operating room personnel, environmental services workers, workers in research laboratories, veterinary care workers, and shipping and receiving personnel). (Note: Updated 2014 version of Appendix A [current sample list of major hazardous drugs] can be found here: http://www.cdc.gov/niosh/docs/2014-138/)
Webpage Workplace Safety & Health Topics: Ebola http://www.cdc.gov/niosh/topics/ebola/	Collection of resources for healthcare workers who may be at risk to the Ebola virus.
3C. CDC Guidance on Emergency Preparedness and Respiratory Protection	
Pandemic Planning: Recommended Guidance for Extended Use and Limited Reuse of N95 Filtering Facepiece Respirators in Healthcare Settings http://www.cdc.gov/niosh/topics/hcwcontrols/RecommendedGuidanceExtUse.html	This document recommends practices for extended use and limited reuse of NIOSH-certified N95 filtering facepiece respirators. The recommendations are intended for use by professionals who manage respiratory protection programs in healthcare institutions to protect healthcare workers from job-related risks of exposure to infectious respiratory illnesses.
Office of Public Health Preparedness and Response Planning Resources by Setting http://www.cdc.gov/phpr/healthcare/planning.htm	In this page, CDC has provided a list of resources to help healthcare facilities plan for possible public health emergencies. These tools are intended for healthcare planners within the specified settings like hospitals, urgent care and long-term care who are tasked with ensuring their facility is prepared to respond to a public health emergency.
Emergency Preparedness and Response http://www.bt.cdc.gov/	Information on terrorism and public health. Covers key issues such as natural disasters, bioterrorism, chemical emergencies, recent incidents, mass casualties, and radiation emergencies.

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Resource Table 3—Resources from the Centers for Disease Control and Prevention (CDC) (continued)

3D. CDC/Infectious Disease (continued)	
Healthcare Infection Control Practices Advisory Committee's (HICPAC) 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings. http://www.cdc.gov/hicpac/2007ip/2007isolationprecautions.html	This document is intended for use by infection control staff, healthcare epidemiologists, healthcare administrators, nurses, other healthcare providers, and persons responsible for developing, implementing, and evaluating infection control programs for healthcare settings across the continuum of care.
Flu.Gov http://www.flu.gov/	This is the official government website containing numerous resources on how to protect oneself from influenza, vaccination, planning and preparedness, and awareness.
Poster Sequence for Donning and Removing Personal Protective Equipment http://www.cdc.gov/hai/pdfs/ppe/ppeposter8511.pdf	This poster demonstrates the sequence for donning and removing PPE. This is intended to reinforce safe practices and limit the spread of contamination.
Morbidity and Mortality Weekly Report (MMWR)—Dec. 30, 2005/Vol. 54/No. RR-17 Guidelines for Preventing the Transmission of Mycobacterium tuberculosis in Health-Care Settings, 2005 http://www.cdc.gov/mmwr/pdf/rr/rr5417.pdf	This report updates TB control recommendations reflecting shifts in the epidemiology of TB, advances in scientific understanding, and changes in healthcare practice that have occurred in the United States during the preceding decade. In the context of diminished risk for healthcare-associated transmission of M. tuberculosis, this document places emphasis on actions to maintain momentum and expertise needed to avert another TB resurgence and to eliminate the lingering threat to HCWs, which is mainly from patients or others with unsuspected and undiagnosed infectious TB disease. CDC prepared the current guidelines in consultation with experts in TB, infection control, environmental control, respiratory protection, and occupational health. The new guidelines have been expanded to address a broader concept; healthcare-associated settings go beyond the previously defined facilities.
Fact Sheet: Respiratory Protection in Health-Care Settings http://www.cdc.gov/tb/publications/factsheets/prevention/rphcs.htm	Quick reference guide covering the fundamental components of an infection-control program. Discusses selection of respirators as well as implementation of a respiratory protection program.
Tools for Protecting Healthcare Personnel—HAI http://www.cdc.gov/HAI/prevent/ppe.html	CDC has developed an instructional program for the selection and use of PPE in healthcare settings, including respiratory protection—as well as posters that demonstrate donning and doffing.

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Resource Table 3—Resources from the Centers for Disease Control and Prevention (CDC) (continued)

3D. CDC/Infectious Disease (continued)	
CDC General Guidance and CDC Response to Ebola (Ebola Virus Disease) http://www.cdc.gov/vhf/ebola/index.html http://www.cdc.gov/vhf/ebola/hcp/procedures-for-ppe.html Respiratory Protection for Ebola - video http://youtu.be/8y19h1hecgY	CDC has developed a comprehensive webpage on their site providing current information about the Ebola outbreak, guidance on the treatment and prevention, information for healthcare workers, and many other resources related to Ebola. CDC has posted a short video that discusses the use of CDC-recommended personal protective equipment (PPE) for respiratory protection when caring for patients with Ebola in U.S. hospitals. The video expands upon the rationale for the CDC recommendation for U.S. healthcare workers to wear a powered air-purifying respirator (PAPR) or an N95 or higher respirator when caring for patients with Ebola. The video is intended to help answer common questions about the inclusion of respiratory protection for Ebola, and the appropriateness of both PAPR and N95 respirator options.
Interim Infection Prevention and Control Recommendations for Hospitalized Patients with Middle East Respiratory Syndrome Coronavirus (MERS-CoV) http://www.cdc.gov/coronavirus/mers/infection-prevention-control.html	Standard, contact, and airborne precautions are recommended for management of hospitalized patients with known or suspected MERS-CoV infection, based on CDC's case definition for patient under investigation. These recommendations are consistent with those recommended for the coronavirus that caused severe acute respiratory syndrome (SARS). As information becomes available, these recommendations will be re-evaluated and updated as needed.
Guidance on Middle East Respiratory Syndrome (MERS) http://www.cdc.gov/coronavirus/mers/index.html	CDC has developed a webpage on their site providing an overview of MERS. This index contains links to the CDC official press release, an FAQ, and safety recommendations for travelers.
Questions and Answers about CDC's Interim Guidance on Infection Control Measures for 2009 H1N1 Influenza in Healthcare Settings Including Protection of Healthcare Workers http://www.cdc.gov/h1n1flu/guidance/control_measures_qa.htm	Archived document on the Infection Control measures for the 2009 H1N1 Influenza pandemic for healthcare settings. (See below for updated current season influenza infection control guidance.)
Prevention Strategies for Seasonal Influenza in Healthcare Settings: Guidelines and Recommendations http://www.cdc.gov/flu/professionals/infectioncontrol/healthcaresettings.htm	This updated guidance (from above resource) continues to emphasize the importance of a comprehensive influenza prevention strategy that can be applied across the entire spectrum of healthcare settings.

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Resource Table 3—Resources from the Centers for Disease Control and Prevention (CDC) (continued)

3D. CDC/Infectious Disease (continued)	
Guidance for the Selection and Use of Personal Protection Equipment (PPE) in Healthcare Settings http://www.cdc.gov/hai/pdfs/ppe/ppeslides6-29-04.pdf	This PowerPoint presentation describes the hierarchy of controls, PPE use, as well as elements of a respiratory protection program.
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 http://www.cdc.gov/flu/avianflu/h7n9-infection-control.htm	This guidance provides recommendations for initial infection control in healthcare settings for patients who may be infected with a novel influenza A virus (i.e., an influenza A virus that has not recently been circulating among humans) associated with severe disease. Patients who may be infected with novel influenza A viruses, and are thus covered by this guidance, include confirmed cases, probable cases, cases under investigation for infection with a novel influenza A virus associated with severe disease, and other patients for whom available clinical and epidemiologic information strongly support a diagnosis of infection with a novel influenza A virus associated with severe disease. Currently, novel influenza A viruses that have been associated with severe disease in humans include highly pathogenic avian influenza A (H5N1) virus and avian influenza A (H7N9) virus.

Resource Table 4—Additional Resources

4A. Professional Associations	
Association of Occupational Health Professionals in Healthcare (AOHP) Fit Test Card http://aohp.org/aohp/Portals/0/Documents/ToolsForYourWork/free_publications/N95_Respirator_Training_and_Fit_Testing_Verification_Card.pdf	The N95 Respiratory Training and Fit Testing Verification Card was created to document the type of N95 respirator for which workers had been trained and fitted. This also includes tips for correctly donning/doffing PPE.
AOHP Beyond Getting Started Series Respiratory Protection in Healthcare Settings: Web Reference Guide https://www.aohp.org/aohp/Portals/0/Documents/ToolsForYourWork/BGG_Respitory Protection.pdf	Links to helpful web resources from OSHA, NIOSH, and others involving respiratory protection in healthcare settings.
AOHP 2013–2015 Public Policy Statement http://aohp.org/aohp/Portals/0/Documents/Resources/AOHP%20Press%20Release%20Apr%202013%20-2015%20Public%20Policy%20statement.pdf	AOHP's Public Policy Statement for 2013-2015 that specifically addresses health and safety concerns in health care. Three key areas of focus are identified, in addition to five targeted health and safety initiatives including bloodborne pathogen exposure, influenza, safe patient handling, respiratory protection, and workplace violence. This direction for the next two years has, in part, been identified by the 2010 AOHP membership survey and needs assessment, and through the partnerships that AOHP has developed.
American Association of Occupational Health Nurses (AAOHN) Respiratory Protection Webkit http://rpp.aaohnacademy.org/	The final webkit, released in May 2014, includes a Respiratory Protection course and accompanying resources. The course is ideal for the occupational and environmental health nurse (OHN) who wants to learn more about OSHA's Respiratory Protection Standard and the role of the OHN as the Respiratory Protection Program Administrator. This training includes numerous resources for the OHN that are provided here in the webkit.
Association of periOperative Registered Nurses (AORN) PowerPoint presentation Management of Surgical Smoke in the Perioperative Setting http://www.aorn.org/WorkArea/DownloadAsset.aspx?id=10737418279	This presentation aimed to discuss perioperative nursing care and recommended practices for operative and/or invasive procedures that have a potential to expose patients and the perioperative team to surgical smoke; also to educate perioperative RNs about the hazards of surgical smoke and the associated nursing care to promote patient and worker safety.

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Resource Table 4—Additional Resources (continued)

4B. Institute of Medicine (IOM)	
The Use and Effectiveness of Powered Air Purifying Respirators in Health Care: Workshop Summary (2015) http://www.iom.edu/Reports/2015/Use-And-Effectiveness-of-Powered-Air-Purifying-Respirators-in-Health-Care.aspx	Since 2005, the National Personal Protective Technology Laboratory (NPPTL) at the National Institute for Occupational Safety and Health (NIOSH) has sponsored the Institute of Medicine (IOM) Standing Committee on Personal Protective Equipment for Workplace Safety and Health. In mid-2014, NPPTL asked the IOM to convene a workshop, "The Use and Effectiveness of Powered Air Purifying Respirators in Health Care," to help prioritize and accelerate NIOSH activities to update certification requirements for powered air purifying respirators (PAPRs) for use in health care.
Research Priorities to Inform Public Health and Medical Practice for Domestic Ebola Virus Disease (EVD): A Workshop (2014) http://iom.edu/Activities/PublicHealth/Ebola-TransmissionResearch/2014-NOV-03/Videos/Welcome%20and%20Early%20Presentations/1-Welcome-Video.aspx Enabling Rapid and Sustainable Public Health Research During Disasters - Workshop Summary http://iom.edu/Reports/2014/Enabling-Rapid-Sustainable-Public-Health-Research-During-Disasters.aspx	An ad hoc committee, under the auspices of the IOM in collaboration with the National Research Council organized a one-day workshop that explored potential research priorities arising as a result of the emergence of Ebola Virus Disease (EVD). The workshop focused primarily on basic science and environmental health research issues of specific concern to affected and potentially affected U.S. communities. Several resources including videos and other reports are provided in the links.
Occupational Health Nurses and Respiratory Protection: Improving Education and Training: Letter Report. Washington, DC: The National Academies Press; 2011. http://www.nap.edu/openbook.php?record_id=13183	At the request of the National Personal Protective Technology Laboratory of the National Institute for Occupational Safety and Health, the Institute of Medicine (IOM) examined existing respiratory protection curricula and made recommendations to improve education and training in respiratory protection for occupational health nurses (OHNs). The IOM finds that current respiratory protection education receives varying amounts of dedicated time and resources and is taught using a variety of approaches. Several recommendations are made to improve the respiratory protection education and training of OHNs.
Reusability of facemasks during an influenza pandemic: Facing the flu. Washington, DC: The National Academies Press; 2006. http://www.nap.edu/openbook.php?record_id=11637	This report answers a specific question about the role of respirators and facemasks to reduce the spread of flu: Can respirators and facemasks that are designed to be disposable be reused safely and effectively? The committee—assisted by outstanding staff—worked intensively to review the pertinent literature; consult with manufacturers, researchers, and medical specialists; and apply their expert judgment. This report offers findings and recommendations based on the evidence, pointing to actions that are appropriate now and to lines of research that can better inform future decisions.

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Resource Table 4—Additional Resources (continued)

4B. Institute of Medicine (IOM) (continued)	
Respirator protection for healthcare workers in the workplace against novel H1N1 Influenza A: A letter report. Washington, DC: The National Academies Press; 2009. http://www.nap.edu/openbook.php?record_id=12748	This new report from the Institute of Medicine recommends strategies for healthcare organizations and employees to prepare for the H1N1 virus. These recommendations include wearing fitted N95 respirators to guard against respiratory infection by the virus, and establishing policies for innovative triage processes, handwashing, disinfection, and more. The report also calls for a boost in research to answer questions about how the flu viruses can be spread, and to design and develop better protective equipment that would enhance workers' comfort, safety, and ability to do their jobs.
Preventing transmission of pandemic influenza and other viral respiratory disease: personal protective equipment for healthcare personnel. Update 2010. Washington, DC: The National Academies Press; 2011. http://www.nap.edu/openbook.php?record_id=13027	In this book, the Institute of Medicine assesses the progress of PPE research and identifies future directions for PPE for healthcare personnel.
4C. Miscellaneous	
Joint Commission Resources PowerPoint presentation and audio conference "Respiratory Protection Programs in Healthcare: Audio conference on Best Practices for Joint Commission Resources." Joint Commission Resources. August 19, 2009. Participants: Buchta W, Sampathkumar P, Theis A, Hogan L, Graham C, Kendig M. Content available by request – contact (630) 792-5800 and ask for the Department of Health Services Research	Topics from this presentation include: • Hazard/risk assessment • Medical clearance • Fit testing • Maintenance/storage of respirators • Lessons learned from H1N1
National Center for Disaster Management & Public Health (NCDMPH) http://ncdmph.usuhs.edu/index.htm	The NCDMPH was established in 2008 by Homeland Security Presidential Directive 21 (HSPD-21), which calls for the Center to be an "academic center of excellence in disaster medicine and public health." By establishing standardizations of core curricula and competencies in disaster medicine and public health education, this organization hopes to better prepare the nation to respond to natural and man-made disasters or other catastrophic public health events.

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Resource Table 4—Additional Resources (continued)

4C. Miscellaneous (continued)	
U.S. Department of Health & Human Services Disaster Information Management Research Center (DIMRC) http://disasterinfo.nlm.nih.gov/	The core purpose of the DIMRC is to develop and provide access to health information resources and technology for disaster preparedness, response, and recovery. The goal is to connect people to quality disaster health information and foster a culture of community resiliency. Recognizing the untapped potential of libraries, librarians, and information services to aid in the nation's disaster management efforts, the National Library of Medicine's (NLM) Long Range Plan (2006-2016) recommended the creation of the DIMRC to help with national emergency preparedness, response, and recovery efforts. As part of NLM's Specialized Information Services division, DIMRC is tasked with the collection, organization, and dissemination of health information resources and informatics research related to disasters of natural, accidental, or deliberate origin.
National Center for Disaster Preparedness: Columbia Regional Learning Center A Training and Education Center for Preparedness and Emergency Response http://ncdp.crlctraining.org/catalog/	A web-based learning management system providing training and just-in-time resources. More than 40 free online courses are available to help public health workers learn skills and knowledge that they will need in a public health emergency.
Public Health Foundation TrainingFinder Real-time Affiliate Integrated Network (TRAIN) https://www.train.org/	Learning resource for public health professionals.

Appendix B: Joint Commission Standards That Directly or Indirectly Relate to Respiratory Protection Programs October 2013

Note: Standards are from The Joint Commission's *Comprehensive Accreditation Manual for Hospitals*, 2013 edition.

Those labeled as

- EC refer to the Environment of Care chapter,
- IC refer to the Infection Prevention and Control chapter,
- IM refer to the Information Management chapter,
- LD refer to the Leadership chapter,
- LS refer to the Life Safety chapter,
- MM refer to the Medication Management chapter,
- PI refer to the Performance Improvement chapter, and
- EM refer to the Emergency Management chapter.

Topics Related to RPPs Crosswalk to Joint Commission Standards

Topic: Role of Leadership in Respiratory Protection Programs	
IC.01.02.01	Hospital leaders allocate needed resources for the infection prevention and control program. EP 1: The hospital provides access to information needed to support the infection prevention and control program. EP 3: The hospital provides equipment and supplies to support the infection prevention and control program.
IC.01.03.01	The hospital identifies risks for acquiring and transmitting infections (based on the following): EP 1: Its geographic location, community, and population served. EP 2: The care, treatment, and services it provides. EP 3: The analysis of surveillance activities and other infection control data. EP 4: The hospital reviews and identifies its risks at least annually and whenever significant changes occur with input from, at a minimum, infection control personnel, medical staff, nursing, and leadership. EP 5: The hospital prioritizes the identified risks for acquiring and transmitting infections. These prioritized risks are documented.
LD.03.01.01	Leaders create and maintain a culture of safety and quality throughout the hospital. EP 1: Leaders regularly evaluate the culture of safety and quality using valid and reliable tools. EP 2: Leaders prioritize and implement changes identified by the evaluation. EP 3: Leaders provide opportunities for all individuals who work in the hospital to participate in safety and quality initiatives. EP 6: Leaders provide education that focuses on safety and quality for all individuals. EP 8: All individuals who work in the hospital, including staff and licensed independent practitioners, are able to openly discuss issues of safety and quality.

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Topics Related to RPPs Crosswalk to Joint Commission Standards (continued)

Topic: Role of Leadership in Respiratory Protection Programs (continued)	
LD.03.02.01	The hospital uses data and information to guide decisions and to understand variation in the performance of processes supporting safety and quality.
LD.03.03.01	Leaders use hospitalwide planning to establish structures and processes that focus on safety and quality. EP 4: Leaders provide the resources needed to support the safety and quality of care, treatment, and services.
LD.03.04.01	The hospital communicates information related to safety and quality to those who need it, including staff, licensed independent practitioners, patients, families, and external interested parties. EP 4: Leaders provide the resources required for communication, based on the needs of the patients, the community, physicians, staff, and management. EP 5: Communication supports safety and quality throughout the hospital.
LD.03.06.01	Those who work in the hospital are focused on improving safety and quality. EP 1: Leaders design work processes to focus individuals on safety and quality issues. EP 4: Those who work in the hospital are competent to complete their assigned responsibilities.
LD.04.01.01	The hospital complies with law and regulation. EP 3: Leaders act on or comply with reports or recommendations from external authorized agencies, such as accreditation, certification, or regulatory bodies.
LD.04.01.11	The hospital makes space and equipment available as needed for the provision of care, treatment, and services. EP 5: The leaders provide for equipment, supplies, and other resources.
LD.04.04.01	Leaders establish priorities for performance improvement. EP 1: Leaders set priorities for performance improvement activities and patient health outcomes.
LD.04.04.03	New or modified services or processes are well designed. EP 1: The hospital's design of new or modified services or processes incorporates the needs of patients, staff, and others. EP 2: The hospital's design of new or modified services or processes incorporates the results of performance improvement activities. EP 3: The hospital's design of new or modified services or processes incorporates information about potential risks to patients. EP 7: Leaders involve staff and patients in the design of new or modified services or processes.
LD.04.04.05	The hospital has an organizationwide, integrated patient safety program within its performance improvement activities. EP 1: The leaders implement a hospitalwide patient safety program.
PI.03.01.01	The hospital improves performance on an ongoing basis. EP 1: Leaders prioritize the identified improvement opportunities.
EM.01.01.01	The hospital engages in planning activities prior to developing its written Emergency Operations Plan. EP 1: The hospital's leaders, including leaders of the medical staff, participate in planning activities prior to developing an Emergency Operations Plan.

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Topics Related to RPPs Crosswalk to Joint Commission Standards (continued)

Topic: Improvement of Respiratory Protection Programs	
PI.01.01.01	The hospital collects data to monitor its performance. The hospital collects data on the following: EP 3: Performance improvement priorities identified by leaders.
PI.02.01.01	The hospital compiles and analyzes data. EP 1: The hospital complies data in usable formats. EP 2: The hospital identifies the frequency for data analysis. EP 3: The hospital uses statistical tools and techniques to analyze and display data. EP 4: The hospital analyzes and compares internal data over time to identify levels of performance, patterns, trends, and variations. EP 5: The hospital compares data with external sources, when available. EP 8: The hospital uses the results of data analysis to identify improvement opportunities. EP 12: When the hospital identifies undesirable patterns, trends, or variations in its performance related to the safety or quality of care (for example, as identified in the analysis of data or a single undesirable event), it includes the adequacy of staffing, including nurse staffing, in its analysis of possible causes.
PI.03.01.01	The hospital improves its performance on an ongoing basis. EP 1: Leaders prioritize the identified improvement opportunities. EP 2: The hospital takes action on improvement priorities. EP 3: The hospital evaluates actions to confirm that they resulted in improvements. EP 4: The hospital takes action when it does not achieve or sustain planned improvements.
LD.04.04.01	Leaders establish priorities for performance improvement. EP 1: Leaders set priorities for performance improvement activities and patient health outcomes.
IC.01.03.01	The hospital evaluates the effectiveness of its infection prevention and control plan.
EC.04.01.01	The hospital collects information to monitor conditions in the environment. EP 1: The hospital establishes a process(es) for continually monitoring, internally reporting, and investigating the following: • Occupational illnesses and staff injuries • Hazardous materials and waste spills and exposures EP 4: Based on its process(es), the hospital reports and investigates the following: • Occupational illnesses and staff injuries EP 8: Based on its process(es), the hospital reports and investigates the following: • Hazardous materials and waste spills and exposures
EC.04.01.03	The hospital analyzes identified environment of care issues. EP 1: Representatives from clinical, administrative, and support services participate in the analysis of environment of care data. EP 2: The hospital uses the results of data analysis to identify opportunities to resolve environmental safety issues. EP 3: Annually, representatives from clinical, administrative, and support services recommend one or more priorities for improving the environment of care.
EC.04.01.05	The hospital improves its environment of care. EP 1: The hospital takes action on the identified opportunities to resolve environmental safety issues. EP 2: The hospital evaluates changes to determine if they resolved environmental safety issues. EP 3: The hospital reports performance improvement results to those responsible for analyzing environment of care issues.

(Continued on page 78)

Topics Related to RPPs Crosswalk to Joint Commission Standards (continued)

Topic: Education/Professional Qualifications of Staff Responsible for Respiratory Protection Programs	
HR.01.02.01	The hospital defines staff qualifications. EP 1: The hospital defines staff qualifications specific to their job responsibilities.
HR.01.02.05.	The hospital verifies staff qualifications. EP 5: Staff comply with applicable health screening as required by law and regulation or hospital policy. Health screening compliance is documented.
HR.01.04.01	The hospital provides orientation to staff. EP 1: The hospital determines the key safety content of orientation provided to staff. EP 2: The hospital orients its staff to the key safety content before staff provides care, treatment, and services. Completion of this orientation is documented. The hospital orients staff on the following: EP 3: Relevant hospitalwide and unit-specific policies and procedures. Completion of this orientation is documented. EP 4: Their specific job duties, including those related to infection prevention and control and assessing and managing pain. Completion of this orientation is documented.
HR.01.05.03	Staff participate in ongoing education and training. EP 1: Staff participate in ongoing education and training to maintain or increase their competency. Staff participation is documented. EP 4: Staff participate in ongoing education and training whenever staff responsibilities change. Staff participation is documented. EP 5: Staff participate in education and training that is specific to the needs of the patient population served by the hospital. Staff participation is documented.
HR.01.06.01	Staff are competent to perform their responsibilities. EP 1: The hospital defines the competencies it requires of its staff who provide patient care, treatment, or services.
EC.03.01.01	Staff and licensed independent practitioners are familiar with their roles and responsibilities relative to the environment of care. EP 1: Staff and licensed independent practitioners can describe or demonstrate methods for eliminating and minimizing physical risks in the environment of care. EP 2: Staff and licensed independent practitioners can describe or demonstrate actions to take in the event of an environment of care incident.
Topic: Prevention of employee, patient, and visitor exposure to respiratory hazards (general infection control)	
IC.01.01.01	The hospital identifies the individual(s) responsible for the infection prevention and control program. EP 1: The hospital identifies the individual(s) with clinical authority over the infection prevention and control program. EP 2: When the individual(s) with clinical authority over the infection prevention and control program does not have expertise in infection prevention and control, he or she consults with someone who has such expertise in order to make knowledgeable decisions. EP 3: The hospital assigns responsibility for the daily management of infection prevention and control activities.
IC.01.02.01	Hospital leaders allocate needed resources for the infection prevention and control program. EP 1: The hospital provides access to information needed to support the infection prevention and control program. EP 3: The hospital provides equipment and supplies to support the infection prevention and control program.

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Topics Related to RPPs Crosswalk to Joint Commission Standards (continued)

Topic: Prevention of employee, patient, and visitor exposure to respiratory hazards (general infection control) (continued)	
IC.01.03.01	The hospital identifies risks for acquiring and transmitting infections based on the following: EP 1: Its geographic location, community, and population served. EP 2: The care, treatment, and services it provides. EP 3: The analysis of surveillance activities and other infection control data. EP 4: The hospital reviews and identifies its risks at least annually and whenever significant changes occur with input from, at a minimum, infection control personnel, medical staff, nursing, and leadership. EP 5: The hospital prioritizes the identified risk for acquiring and transmitting infections. These prioritized risks are documented.
IC.01.04.01	Based on the identified risks, the hospital sets goals to minimize the possibility of transmitting infections. The hospital's written infection prevention and control goals include the following: EP 1: Addressing its prioritized risks. EP 2: Limiting unprotected exposure to pathogens. EP 3: Limiting the transmission of infections associated with procedures. EP 4: Limiting the transmission of infections associated with the use of medical equipment, devices, and supplies.
IC.01.05.01	The hospital has an infection prevention and control plan. EP 6: All hospital components and functions are integrated into infection prevention and control activities. EP 7: The hospital has a method for communicating responsibilities about preventing and controlling infection to licensed independent practitioners, staff, visitors, patients, and families. Information for visitors, patients, and families includes hand and respiratory hygiene practices.
IC.01.06.01	The hospital prepares to respond to an influx of potentially infectious patients. EP 1: The hospital identifies resources that can provide information about infections that could cause an influx of potentially infectious patients. EP 2: The hospital obtains current clinical and epidemiological information from its resources regarding new infections that could cause an influx of potentially infectious patients. EP 3: The hospital has a method for communicating critical information to licensed independent practitioners and staff about emerging infections that could cause an influx of potentially infectious patients. EP 4: The hospital describes, in writing, how it will respond to an influx of potentially infectious patients. EP 5: If the hospital decides to accept an influx of potentially infectious patients, then the hospital describes in writing its methods for managing these patients over an extended period of time. EP 6: When the hospital determines it is necessary, the hospital activates its response to an influx of potentially infectious patients.
IC.02.01.01	The hospital implements its infection control and prevention plan. EP 1: The hospital implements its infection prevention and control activities, including surveillance, to minimize, reduce, or eliminate the risk of infection. EP 2: The hospital uses standard precautions, including the use of personal protective equipment, to reduce the risk of infection. EP 3: The hospital implements transmission-based precautions in response to the pathogens that are suspected or identified within the hospital's service setting and community. EP 5: The hospital investigates outbreaks of infectious disease. EP 7: The hospital implements its methods to communicate responsibilities for preventing and controlling infection to licensed independent practitioners, staff, visitors, patients, and families. Information for visitors, patients, and families includes hand and respiratory hygiene practices. EP 8: The hospital reports infection surveillance, prevention, and control information to the appropriate staff within the hospital. (this standard continues on page 80)

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Topics Related to RPPs Crosswalk to Joint Commission Standards (continued)

Topic: Prevention of employee, patient, and visitor exposure to respiratory hazards (general infection control) (continued)	
IC.02.01.01 (continued)	EP 9: The hospital reports infection surveillance, prevention, and control information to local, state, and federal public health authorities in accordance with law and regulation. EP 10: When the hospital becomes aware that it transferred a patient who has an infection requiring monitoring, treatment, and/or isolation, it informs the receiving organization. EP 11: When the hospital becomes aware that it received a patient from another organization who has an infection requiring action, and the infection was one communicated by the referring organization, it informs the referring organization.
IC.02.02.01	The hospital reduces the risk of infections associated with medical equipment, devices, and supplies. The hospital implements infection prevention and control activities when doing the following: EP 1: Cleaning and performing low-level disinfection of medical equipment, devices, and supplies. EP 2: Performing intermediate and high-level disinfection and sterilization of medical equipment, devices, and supplies. EP 3: Disposing of medical equipment, devices, and supplies. EP 4: Storing medical equipment, devices, and supplies. EP 5: When reprocessing single-use devices, the hospital implements infection prevention and control activities that are consistent with regulatory and professional standards.
IC.02.03.01	The hospital works to prevent the transmission of infectious disease among patients, licensed independent practitioners, and staff. EP 1: The hospital makes screening for exposure and/or immunity to infectious disease available to licensed independent practitioners and staff who may come in contract with infections at the workplace.
IC.03.01.01	The hospital evaluates the effectiveness of its infection prevention and control plan. EP 1: The hospital evaluates the effectiveness of its infection prevention and control plan annually and whenever risks significantly change. The evaluation includes a review of the following: EP 2: The infection prevention and control plan's prioritized risks. EP 3: The infection prevention and control plan's goals. EP 4: Implementation of the infection prevention and control plan's activities. EP 6: Findings from the evaluation are communicated at least annually to the individuals or interdisciplinary group that manages the patient safety program. EP 7: The hospital uses the findings of its evaluation of the infection prevention and control plan when revising the plan.
NSPG.07.03.01	Implement evidence-based practices to prevent health care–associated infections due to multidrug-resistant organisms in acute care hospitals. EP 1: Conduct periodic risk assessments (in time frames defined by the hospital) for multidrug-resistant organism acquisition and transmission. EP 2: Based on the results of the risk assessment, educate staff and licensed independent practitioners about health care–associated infections, multidrug-resistant organisms, and prevention strategies at hire and annually thereafter. EP 3: Educate patients, and their families as needed, who are infected or colonized with a multidrug-resistant organism about health care–associated infection prevention strategies.

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Topics Related to RPPs Crosswalk to Joint Commission Standards (continued)

Topic: Prevention of employee, patient, and visitor exposure to respiratory hazards (general infection control) (continued)	
EC.02.02.01	The hospital manages risks related to hazardous materials and waste. EP 1: The hospital maintains a written, current inventory of hazardous materials and waste that it uses, stores, or generates. The only materials that need to be included on the inventory are those whose handling, use, and storage are addressed by law and regulation. EP 3: The hospital has written procedures, including the use of precautions and personal protective equipment, to follow in response to hazardous material and waste spills or exposures. EP 4: The hospital implements its procedures in response to hazardous material and waste spills or exposures. EP 11: For managing hazardous materials and waste, the hospital has the permits, licenses, manifests, and material safety data sheets required by law and regulation. EP12: The hospital labels hazardous materials and waste. Labels identify the contents and hazard warnings.
EC.03.01.01	Staff and licensed independent practitioners are familiar with their roles and responsibilities relative to the environment of care. EP 1: Staff and licensed independent practitioners can describe or demonstrate methods for eliminating and minimizing physical risks in the environment of care. EP 2: Staff and licensed independent practitioners can describe or demonstrate actions to take in the event of an environment of care incident.
EC.04.01.01	The hospital collects information to monitor conditions in the environment. EP 1: The hospital establishes a process(es) for continually monitoring, internally reporting, and investigating the following: • Occupational illnesses and staff injuries • Hazardous materials and waste spills and exposures EP 4: Based on its process(es), the hospital reports and investigates the following: • Occupational illnesses and staff injuries EP 8: Based on its process(es), the hospital reports and investigates the following: • Hazardous materials and waste spills and exposures.
Topic: Emergency preparedness for potential respiratory hazards or outbreaks	
EM.01.01.01	The hospital engages in planning activities prior to developing its written Emergency Operations Plan. EP 1: The hospital's leaders, including leaders of the medical staff, participate in planning activities prior to developing an Emergency Operations Plan. EP 2: The hospital conducts a hazard vulnerability analysis to identify potential emergencies that could affect demand for the hospital's services or its ability to provide those services, the likelihood of those events occurring, and the consequences of those events. The findings of this analysis are documented. *Note 2: If the hospital identifies a surge in infectious patients as a potential emergency, this issue is addressed in the Infection Prevention and Control (IC) standards and chapter.*
EM.02.01.01	The hospital has an Emergency Operations Plan. EP 1: The hospital leaders, including leaders of the medical staff, participate in the development of the Emergency Operations Plan. EP 2: The hospital develops and maintains a written Emergency Operations Plan that describes the response procedures to follow when emergencies occur. EP 3: The Emergency Operations Plan identifies the hospital's capabilities and establishes response procedures for when the hospital cannot be supported by the local community in the hospital's efforts to provide communications, resources and assets, security and safety, staff, utilities, or patient care for at least 96 hours. *Note: Hospitals are not required to stockpile supplies to last for 96 hours of operation.* EP 6: The Emergency Operations Plan identifies the individual(s) who has the authority to activate the response and recovery phases of the emergency response. EP 8: If the hospital experiences an actual emergency, the hospital implements its response procedures related to care, treatment, and services for its patients.

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Topics Related to RPPs Crosswalk to Joint Commission Standards (continued)

Topic: Emergency preparedness for potential respiratory hazards or outbreaks (continued)	
EM.02.02.01	As part of its Emergency Operations Plan, the hospital prepares for how it will communicate during emergencies. The Emergency Operations Plan includes the following: EP 1: How staff will be notified that emergency response procedures have been initiated. EP 2: How the hospital will communicate information and instructions to its staff and licensed independent practitioners during an emergency. EP 7: How the hospital will communicate with suppliers of essential services, equipment, and supplies during the emergency.
EM.02.02.03	As part of its Emergency Operations Plan, the hospital prepares for how it will manage resources and assets during emergencies. The Emergency Operations Plan includes the following: EP 1: How the hospital will obtain and replenish medications and related supplies that will be required throughout the response and recovery phases of an emergency, including access to and distribution of caches that may be stockpiled by the hospital, its affiliates, or local, state, or federal sources. EP 2: How the hospital will obtain and replenish medical supplies that will be required throughout the response and recovery phases of an emergency, including personal protective equipment where required. EP 6: How the hospital will monitor quantities of its resourses and assets during an emergency. EP 12: The hospital implements the components of its Emergency Operations Plan that require advance preparation to provide for resources and assets during an emergency.
EM.02.02.05	As part of its Emergency Operations Plan, the hospital prepares for how it will manage security and safety during an emergency. The Emergency Operations Plan includes the following: EP 4: How the hospital will manage hazardous materials and waste. EP 5: How the hospital will provide for radioactive, biological, and chemical isolation and decontamination.
EM.03.01.03	The hospital evaluates the effectiveness of its Emergency Operations Plan (Rationale: The organization conducts exercise to assess the Emergency Operations Plan's appropriateness; adequacy; and the effectiveness of logistics, human resources, training, policies, procedures and protocols.)
Topic: Integration with safety programs; OSHA general duty clause	
LD.04.04.05	The hospital has an organizationwide, integrated patient safety program within its performance improvement activities. EP 1: The leaders implement a hospitalwide patient safety program.
EC.02.01.01	The hospital manages safety and security risks. EP 1: The hospital identifies safety and security risks associated with the environment of care that could affect patients, staff, and other people coming to the hospital's facilities. EP 2: The hospital takes action to minimize or eliminate identified safety and security risks in the physical environment.
EC.02.02.01	The hospital manages risks related to hazardous materials and waste. EP 1: The hospital maintains a written, current inventory of hazardous materials and waste that it uses, stores, or generates. The only materials that need to be included on the inventory are those whose handling, use, and storage are addressed by law and regulation. EP 3: The hospital has written procedures, including the use of precautions and personal protective equipment, to follow in response to hazardous material and waste spills or exposures. EP 4: The hospital implements its procedures in response to hazardous material and waste spills or exposures. (this standard continues on page 83)

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Topics Related to RPPs Crosswalk to Joint Commission Standards (continued)

Topic: Integration with safety programs; OSHA general duty clause (continued)	
EC.02.02.01 (continued)	EP 5: The hospital minimizes risks associated with selecting, handling, storing, transporting, using, and disposing of hazardous chemicals. EP 7: The hospital minimizes risks associated with selecting and using hazardous energy sources. EP 9: The hospital minimizes risks associated with selecting, handling, storing, transporting, using, a disposing of hazardous gases and vapors. EP 10: The hospital monitors levels of hazardous gases and vapors to determine that they are in safe range. EP 11: For managing hazardous materials and waste, the hospital has the permits, licenses, manifests, and material safety data sheets required by law and regulation. EP 12: The hospital labels hazardous materials and waste. Labels identify the contents and hazard warnings.
EC.02.04.01	The hospital manages medical equipment risks. EP 1: The hospital solicits input from individuals who operate and service equipment when it selects and acquires medical equipment. EP 2: The hospital maintains either a written inventory of all medical equipment or a written inventory of selected equipment categorized by physical risk associated with use and equipment incident history. The hospital evaluates new types of equipment before initial use to determine whether they should be included in the inventory. EP 3: The hospital identifies the activities, in writing, for maintaining, inspecting, and testing for all medical equipment on the inventory. EP 4: The hospital identifies, in writing, frequencies for inspecting, testing, and maintaining medical equipment on the inventory based on criteria such as manufacturers' recommendations, risk levels, or current hospital experience. EP 5: The hospital monitors and reports all incidents in which medical equipment is suspected in or attributed to the death, serious injury, or serious illness of any individual, as required by the Safe Medical Devices Act of 1990. EP 6: The hospital has written procedures to follow when medical equipment fails, including using emergency clinical interventions and backup equipment.
EC.03.01.01	Staff and licensed independent practitioners are familiar with their roles and responsibilities relative to the environment of care. EP 1: Staff and licensed independent practitioners can describe or demonstrate methods for eliminating and minimizing physical risks in the environment of care. EP 2: Staff and licensed independent practitioners can describe or demonstrate actions to take in the event of an environment of care incident.
EC.04.01.01	The hospital collects information to monitor conditions in the environment. EP 1: The hospital establishes a process(es) for continually monitoring, internally reporting, and investigating the following: • Occupational illnesses and staff injuries • Hazardous materials and waste spills and exposures • Medical or laboratory equipment management problems, failures, and use errors Based on its process(es), the hospital reports and investigates the following: EP 4: Occupational illnesses and staff injuries EP 8: Hazardous materials and waste spills and exposures EP 10: Medical/laboratory equipment management problems, failures, and use errors

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Topics Related to RPPs Crosswalk to Joint Commission Standards (continued)

Topic: Integration with safety programs; OSHA general duty clause (continued)	
EC.04.01.03	The hospital analyzes identified environment of care issues. EP 1: Representatives from clinical, administrative, and support services participate in the analysis of environment of care data. EP 2: The hospital uses the results of data analysis to identify opportunities to resolve environmental safety issues. EP 3: Annually, representatives from clinical, administrative, and support services recommend one or more priorities for improving the environment of care.
EC.04.01.05	The hospital improves its environment of care. EP 1: The hospital takes action on the identified opportunities to resolve environmental safety issues. EP 2: The hospital evaluates changes to determine if they resolved environmental safety issues. EP 3: The hospital reports performance improvement results to those responsible for analyzing environment of care issues.
MM.01.01.03	The hospital safely manages high-alert and hazardous medications. EP 1: The hospital identifies, in writing, its high-alert and hazardous medications. EP 2: The hospital has a process for managing high-alert and hazardous medications. EP 3: The hospital implements its process for managing high-alert medications.
Topic: OSHA Record keeping	
EC.04.01.01	The hospital collects information to monitor conditions in the environment. EP 1: The hospital establishes a process(es) for continually monitoring, internally reporting, and investigating the following: • Occupational illnesses and staff injuries • Hazardous materials and waste spills and exposures • Medical or laboratory equipment management problems, failures, and use errors Based on its process(es), the hospital reports and investigates the following: EP 4: Occupational illnesses and staff injuries EP 8: Hazardous materials and waste spills and exposures EP 10: Medical/laboratory equipment management problems, failures, and use errors
EC.02.02.01	The hospital manages risks related to hazardous materials and waste. EP 1: The hospital maintains a written, current inventory of hazardous materials and waste that it uses, stores, or generates. The only materials that need to be included on the inventory are those whose handling, use, and storage are addressed by law and regulation. EP 3: The hospital has written procedures, including the use of precautions and personal protective equipment, to follow in response to hazardous material and waste spills or exposures. EP 4: The hospital implements its procedures in response to hazardous material and waste spills or exposures. EP 11: For managing hazardous materials and waste, the hospital has the permits, licenses, manifests, and material safety data sheets required by law and regulation. EP 12: The hospital labels hazardous materials and waste. Labels identify the contents and hazard warnings.
HR.01.06.01	Staff are competent to perform their responsibilities. EP 1: The hospital defines the competencies it requires of its staff who provide patient care, treatment, or services.
EC.03.01.01	Staff and licensed independent practitioners are familiar with their roles and responsibilities relative to the environment of care. EP 1: Staff and licensed independent practitioners can describe or demonstrate methods for eliminating and minimizing physical risks in the environment of care. EP 2: Staff and licensed independent practitioners can describe or demonstrate actions to take in the event of an environment of care incident.

Appendix C: Organizations Mentioned in the Monograph

Organization	Point of Contact (September 2014)	Location
Centers for Disease Control and Prevention National Institute for Occupational Safety and Health Division of Surveillance, Hazard Evaluations, and Field Studies 1090 Tusculum Avenue Cincinnati, OH 45226-1998	Jim Boiano, MS, CIH Senior Industrial Hygienist jboiano@cdc.gov Andrea Steege, PhD, MPH Epidemiologist asteege@cdc.gov	Sidebar 1-1 (p.5)
Dameron Hospital 525 W. Acacia Street Stockton, CA 95203	Mark Koenig, MS, CHSP, HACP Director, Hospital Safety Officer m.koenig@dameronhospital.org	Ch. 2 — Examples of using a team approach to oversight and coordination (p.13)
Allegiance Health Respiratory Therapy 205 N. East Avenue Jackson, MI 49201	Kevin May, MAOM, RRT kevin.may@southernregional.org	Ch. 2 — Examples of using a standing respiratory protection committee and team approach to oversight and coordination (p.13)
St. Mary's Hospital Employee Health 700 South Park Street Madison, WI 53715	Karen Ott, RN, BSN, COHN-S Employee Health Manager, SSM Health Care karen_ott@ssmhc.com	Ch. 2 — Delegating activities across areas (p.13) Ch. 3 — Strategies for providing education for limited-English proficiency (p.36)
Vanderbilt University Suite 640 Occupational Health 1121 21st Avenue South Nashville, TN 37212	Susan N. Johnson, MS, MT(ASCP), CSP Assistant Director VEHS Medical Center Safety Officer s.johnson@vanderbilt.edu Paula W. McGown, MSN, MAcc, RN, FNP-BC, CPA Administrative Officer paula.mcgown@vanderbilt.edu	Ch. 2 — Delegating activities across areas (p.13), linking compliance with annual performance review, effective tracking through databases (p.14) Case Study 2.1 (p.21) Ch. 3 — Quote on providing annual fit testing and training to a large and diverse workforce (p.29) Ch. 4 — Effective coordination with a written RPP plan (p.42)
VISN-6 (Veterans Integrated Service Network-6) 300 W. Morgan Street, Suite 700 Durham, NC 27701	Wendy Kady, CIH, CSP, CHSP VISN-6 Green Environmental Management System (GEMS) Manager wendy.kady@va.gov	Ch. 2 — Incorporating consequences for not adhering to the policy (p.14) Case Study 3.2 (p.40)
Brandon Regional Hospital 119 Oakfield Drive Brandon, FL 33511	Valerie Henderson, RN, MA, CIC, COHN-S Infection Control Specialist valerie.henderson@hcahealthcare.com	Ch. 2 — Enforcing consequences for not adhering to the policy (p.14)
OSF Saint Francis Medical Center Occupational Health 100 NE Randolph Avenue Peoria, IL 61606	Jo Garrison, MS, RN Director of Business and Community Health jo.a.garrison@osfhealthcare.org	Case Study 2.2 (p.23)
BJC HealthCare Mailstop 92-92-241 8300 Eager Road, Suite 400-A St. Louis, MO 63144	Nancy Gemeinhart, RN, MHA, CIC Program Director, BJC Occupational Health Services nxg1479@bjc.org	Case Study 2.3 (p.27)

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Organization	*Point of Contact (September 2014)*	*Location*
MedStar St. Mary's Hospital 25500 Point Lookout Road P.O. Box 527 Leonardtown, MD 20650	Connie Pritt, BSN, MBA Registered Nurse connie_pritt@smhwecare.com	Ch. 3 — Quote regarding challenges with coordinating training for all staff (p.29), training those who have the possibility of interacting with a patient on airborne isolations (p.30)
Dallas Medical Center 7 Medical Parkway Dallas, TX 75248	Chantal Besa, MPH Infection Prevention Practitioner cbesa@primehealthcare.com	Ch. 3 — Improving comfort in wearing respirators (p.33)
Reston Hospital Center 1850 Town Center Parkway Reston, VA 20190	Cindy Robinson, RN Director Infection Prevention & Control cindy.robinson@hcahealthcare.com	Ch. 3 — Approaches used to ensure preparedness in the event of a pandemic or other large-scale exposure to potentially hazardous respiratory agents (p.34)
Reedsburg Area Medical Center 2000 North Dewey Avenue Reedsburg, WI 53959	Peg Dobrovolny, RN, BSN, CIC Infection Control Preventionist pdobrovolny@ramchealth.org	Ch. 3 — Approaches used to ensure preparedness in the event of a pandemic or other large-scale exposure to potentially hazardous respiratory agents (p.34) Case Study 3.1 (p.38)
Norton Hospital N-46 Respiratory Dept. 200 East Chestnut Street Louisville, KY 40202	Sandra Petter System Pulmonary Services Director sandra.petter@nortonhealthcare.org	Ch. 3 — Determining effectiveness of education and educational needs by an oversight group (p.35), training modified according to language and education needs (p.36) Sidebar 3-2 (p.36)
Stormont-Vail HealthCare 1500 SW 10th Avenue Topeka, KS 66604	Stacy Stromgren, RN Employee Health Supervisor sstromgr@stormontvail.org	Ch. 3 — Modifying strategies for education (p.36)
Valley Regional Medical Center 100 E. Alton Gloor Boulevard Brownsville, TX 78526	Connie Manley, RN, BSN VRMC Trauma Manager connie.manley@hcahealthcare.com	Sidebar 4-1 (p.43)
Grady Health System Respiratory Care Services 80 Jesse Hill Jr. Drive P.O. Box 26034 Atlanta, GA 30303	Cynthia Alexander Director of Respiratory Care calexander@gmh.edu	Ch. 4 — Protecting high-risk workers from hazardous respiratory agents (p.43) Case Study 4.1 (p.49)
Presbyterian Intercommunity Hospital 12401 Washington Boulevard Whittier, CA 90602-1006	Hal Herlong Director Respiratory Services hherlong@pih.net	Ch. 4 — Tailoring evaluation methods to different components of the program (p.46)
NYU Langone Medical Center GBH Suite C-114 545 First Avenue New York, NY 10016	Maxine Simon, FACHE, CHC, CHPC Chief Regulatory Officer maxine.simon@nyumc.org	Ch. 4 — Tailoring evaluation methods to different components of the program (p.46)
Capital Region Medical Center 1125 Madison Street Jefferson City, MO 65101	Jan Faulconer, RN Employee Health Nurse jfaulconer@crmc.org	Ch. 4 — Using multiple methods and metrics to evaluate the respiratory protection program (p.46)
Texas Center for Infectious Disease 2303 SE Military Drive San Antonio, TX 78223	James N. Elkins, FACHE Hospital Superintendent jim.elkins@dshs.state.tx.us	Case Study 4.2 (p.50)

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