



Personal Protective Equipment (PPE) Toolkit



OneLab™



Personal Protective Equipment Toolkit



Disclaimer

This toolkit is designed for clinical and public health laboratories, and its content is intended for informational purposes only. The inclusion of specific resources does not imply endorsement or recommendation by the Department of Health and Human Services or the Centers for Disease Control and Prevention (CDC).

CDC is not responsible for any errors or omissions that may occur by individuals using this toolkit. Each laboratory must comply with applicable federal, state, territorial, and local requirements and ensure its manuals and products contain the correct information specific to the laboratory's processes and procedures.

Each laboratory should determine how often its personal protective equipment (PPE) processes and procedures should be updated. Best practices should be to make updates on a predetermined regular basis, such as annually.





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Personal Protective Equipment Toolkit



Introduction

The Personal Protective Equipment (PPE) Toolkit is a guide to resources on using PPE in clinical and public health laboratories. It is based on CDC recommendations and Occupational Safety and Health Administration (OSHA) PPE standards. These standards list PPE requirements and guide training efforts.

PPE worn at work should be based on site-specific risk assessments and SOPs, which may vary based on how and where the task or testing is being performed. PPE comes in different types designed to protect specific body parts from hazards encountered in the laboratory environment.

For more information on risk assessment, review the [Biological Risk Assessment: General Considerations for Laboratories \(cdc.gov\)](#).

The PPE Toolkit includes helpful information and suggestions for adapting PPE components within laboratory settings and using PPE safely.

This toolkit contains the following sections on PPE:

- Standards
- Selection
- Training Requirements
- Training Materials
- Training Documentation
- Competency Assessment
- Supply Management
- Training Program Development
- Additional Resources

Important: We recommend that you use this toolkit in its online form so direct links to templates and resources are easily accessible to you.

PPE Standards

PPE is specialized clothing and equipment designed to minimize exposure to hazards that cause serious workplace injuries and illnesses. When used appropriately, PPE provides a barrier between the skin, mouth, nose, or eyes (mucous membranes) and infectious materials such as viral and bacterial contaminants.

OSHA's Laboratory Standards (specifically Occupational Safety and Health Standard 29 CFR 1910) provide the general standards that can help protect employees who work in laboratories. Enforcement of OSHA standards may be a shared responsibility of the federal government and state occupational safety and health programs.



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As part of those standards, OSHA has established guidance [29 CFR 1910 Subpart I: Personal Protective Equipment](#), which regulates PPE standards and usage.

Employers must:

- Ensure PPE is used and maintained in a sanitary and reliable condition to protect employees from hazards.
- Ensure employee-owned equipment is adequate, maintained, and sanitary.
- Ensure the PPE being used is safe in design and construction.
- Conduct a hazard assessment and select protective equipment accordingly.
- Prohibit the use of defective or damaged protective equipment.
- Provide PPE training to employees.
- Provide required PPE at no cost to employees, except for non-specialty safety-toe protective footwear and non-specialty prescription safety eyewear.



In addition, the National Institute for Occupational Safety and Health (NIOSH) collaborates with OSHA to improve workplace safety and health practices. NIOSH has developed a comprehensive search tool, the [PPE-Info Database](#), to help individuals locate relevant federal regulations and consensus standards for PPE.

Lastly, [22 OSHA-approved occupational safety and health State Plans](#) are currently in effect. State Plans are OSHA-approved workplace safety and health programs operated by individual states or U.S. territories. The State Plans' standards are at least as effective as OSHA's federal guidelines and may feature more stringent standards for PPE.

PPE Selection

PPE selection must be based on the level of protection identified through site- and procedure/activity-specific risk assessments, which evaluate the task(s) or procedure(s) being performed and the location(s) of these activities. Table 1 lists protection areas and examples of standard PPE used in clinical and public health laboratories.

Table 1: PPE Protection Areas

Areas: Eye and face protection

Description: Protects eyes or face from flying objects, droplets, and splash substances

PPE Types: Eye protectors (safety glasses, goggles)
Face protectors (shields, masks)

Link to Standard: [29 CFR 1910.133](#)



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Area: Respiratory protection

Description: Helps protect the respiratory system from exposure to infectious aerosols or droplets generated during routine procedures

PPE Types: Filtering facepiece respirators (N95)

Link to Standard: [29 CFR 1910.134](#)



Area: Hand protection

Description: Helps protect hands from exposure to hazardous materials and reduces risks associated with skin contact

PPE Types: Safety gloves (latex, nitrile)

Link to Standard: [29 CFR 1910.138](#)



Area: Body protection

Description: Helps shield the body from hazards (e.g., chemicals, infectious bodily fluids, and other hazardous materials)

PPE Types: Wraparound gowns, laboratory coats

Link to Consideration: [Protective Clothing](#)



Areas: Foot protection

Description: Helps protect feet from splashes, chemicals, heat, and other hazards, such as crush injuries

PPE Types: Disposable booties or shoe covers, closed-toe shoes with solid and impermeable uppers

Link to Standard: [29 CFR 1910.136](#)





PPE Training Requirements

[OSHA Standard 29 CFR 1910.132\(f\)](#) outlines requirements for PPE training. According to this standard, at minimum, each employee should know the following:

- When PPE is necessary
- What PPE is necessary
- What the difference is between donning (putting on) and doffing (taking off) PPE
- How to properly don, doff, adjust, and wear PPE
- What the limitations of PPE are
- What the guidelines are for the proper care, maintenance, useful life, and disposal of PPE

PPE training should be provided at the following times:

- Upon hiring
- Periodically throughout employment, annually at a minimum
- Whenever an employee seems to lack the understanding or skill to use PPE properly
- Whenever changes in the workplace or changes in the types of PPE make previous training obsolete

Table 2 outlines PPE training guidance.

Table 2: PPE Training Guidance

When PPE is necessary:



Guidance:

Use PPE when conducting tasks involving potential exposures to hazardous materials or physical hazards in the workplace.

Usage Example:

Employees wearing PPE determined by procedure-specific risk assessment while aliquoting potential hazardous specimens.

What PPE is necessary:



Guidance:

Review risk assessments to identify the required PPE to use.

Usage Example:

Perform a site- and procedure/activity-specific risk assessment to determine the appropriate PPE. Identify the hazards before performing procedures (e.g., manipulation of patient specimens) and selecting the proper PPE to minimize the risk of possible infectious exposure (e.g., aerosol, splash protection).



What are the limitations of PPE?



Guidance:

PPE only protects the wearer. It is ineffective if not working or appropriately fitted, and protection levels are seldom reached. The use of PPE restricts the wearer to some degree. The psychological effect of PPE may be that the individual wearing the PPE feels more protected than they are.

Usage Example:

Ensure the PPE is proper for the procedure and in good, clean condition and is used in combination with other control measures.

Explain how PPE effectiveness could be compromised (e.g., facial hair interferes with the proper fit of masks) or have an adverse effect on employees (e.g., heat stress and risk of dehydration).

How to properly don, doff, adjust, and wear PPE:



Guidance:

Staff must be medically fit to wear N95 masks. Instruct and demonstrate each step of donning and doffing procedures.

Visually confirm that employees have completed each step to ensure adherence to procedures.

Usage Example:

Confirm that employees are comfortable and able to extend their arms, bend at the waist, and go through a variety of motions to ensure they have a sufficient range of movement while all body areas remain covered.

Identify locations for PPE storage and donning and doffing of PPE.

What the guidelines are for the proper care, maintenance, useful life, and disposal of PPE:



Guidance:

Store PPE in a clean, dry location that maintains the proper temperature. Review the manufacturer's PPE requirements for maintenance, useful life span, and decontamination procedures for reusable PPE.

Waste disposal regulations vary at the state and local levels; therefore, all waste disposals must comply with local, regional, state, national, and international regulations.



Usage Example:

Demonstrate how to properly clean reusable PPE and discuss the importance of proper cleaning (e.g., dirty goggles could impair vision or increase the risk of contamination).

Demonstrate regularly how to inspect PPE for damages or general wear and tear.

Refer to laboratory policies and procedures regarding the proper disposal of hazardous waste.



PPE Training Materials

CDC provides several PPE training materials, including web-based training courses, webinars, interactive sessions, informational videos, and job aids. You can access these resources through the links below.

CDC Web-Based Training

- [Fundamentals of Personal Protective Equipment \(PPE\) in Clinical Laboratories](#)
 - This course is designed to assist clinical and public health laboratory professionals apply risk management strategies to identify hazards, assess risks, and select appropriate PPE.
- [Lab TrainingVR: Personal Protective Equipment \(PPE\) Edition](#)
 - This course empowers learners to apply knowledge and practice selecting appropriate PPE and properly donning and doffing it in a virtual museum.

CDC Microlearning Videos

- [Donning and Doffing PPE in Clinical Laboratories: Basic PPE for Routine Laboratory Procedures](#)
 - This short video discusses basic PPE donning and doffing procedures in a clinical laboratory.
- [Donning and Doffing PPE in Clinical Laboratories: Removing Gown First and Gloves Second](#)
 - This short video discusses the procedure for removing the gown before the gloves when doffing PPE in a clinical laboratory.
- [Donning and Doffing PPE in Clinical Laboratories: Removing Gown and Gloves Together](#)
 - This short video discusses the procedure for removing the gown and gloves together when doffing PPE in a clinical laboratory.

CDC Microlearning Job Aids

- [How to Knot and Tuck Your Mask to Improve Fit](#)
 - This brief video demonstrates how to improve the fit of a face mask.

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- [PPE Sequence](#)
 - This printable job aid demonstrates the sequences for donning and doffing PPE.
- [Glove Removal Job Aid](#)
 - This printable job aid shows how to remove gloves safely.

PPE Training Documentation

Employers must maintain training records for all employees. These records document employees' understanding of their training and their ability to select and use PPE properly. Employers must keep training records current and provide them to authorized officials upon request.

Employers must document and save records of employees' course completions or certificates for web-based training.

PPE Competency Assessments

After adequate training, employees should be proficient in choosing the correct PPE based on site- and procedure/activity-specific risk assessment and donning and doffing PPE properly.

Still, competency assessments can identify potential knowledge or skill gaps. The following assessments should be conducted:

- When an employee undergoes initial PPE training before performing work that requires PPE
- When changes occur in the workplace, processes, or procedures
- When an employee lacks the understanding or skill to use PPE properly

Competency assessments can be conducted through direct observation. As with training documentation, employers must maintain records of competency assessments for all employees. Resources for training documentation and competency assessments can be found below.

- [PPE Group Training Template](#)
 - This printable PDF is an example of a training record that can be used to document the completion of required PPE training.
- [PPE Competency Assessment Template Donning and Doffing](#)
 - This printable PDF can be used to assess employees' PPE competence.

PPE Supply Management

Having appropriate PPE supplies is critical for laboratory professionals to perform their work. Implementing a PPE supply management plan would benefit laboratories by ensuring PPE supplies remain at the needed levels.



A PPE supply management plan should include:

- The scope and purpose of the plan and the benefits the plan will provide the laboratory
- An organizational chart that defines the PPE supply management responsibilities of laboratory staff members
- A checklist and guidelines for all PPE used in the laboratory
- Procedures for the decontamination of reusable PPE
- Policies for the extended use or reuse of non-visibly soiled PPE
- Methods for forecasting a potential PPE shortage
- Processes for quality monitoring and inventory management
- A regular review process for the PPE supply management plan



Finally, you can monitor your PPE supply and forecast your PPE needs with some assistance from the following tools:

- [PPE Burn Rate Calculator](#)
 - A spreadsheet that uses three levels to describe surge capacity and prioritize measures to conserve PPE supplies.
- [NIOSH PPE Tracker App](#)
 - An iOS- or Android-friendly application with a burn rate calculator, inventory tracker, and reporting functions.

Developing a Laboratory PPE Program

Various levels of staff involved in laboratory processes and procedures (e.g., laboratory management, occupational health and safety personnel, laboratory personnel, and quality management) should help develop a PPE program.

Effective PPE use typically involves establishing and complying with multiple guidelines, policies, and procedures. Having a PPE program provides an excellent foundation. However, laboratories can develop more comprehensive PPE plans that address the hazards found during a risk assessment; the selection, maintenance, and use of PPE; employee training; and ongoing program monitoring to ensure effectiveness. They can create formal documents that define health and safety requirements, expectations, and responsibilities regarding PPE.

Table 3 provides a guide on what to include in a PPE program. This toolkit's resources (e.g., training courses, job aids, and templates) can be customized for and incorporated into any program.



Table 3: PPE Program Resources

PPE guidance and standards



Provide laboratory occupational health and safety policies, OSHA standards, PPE best practices, and regulatory resources that outline program development requirements.

Administrative duties and responsibilities

Perform site and activity specific-risk assessment. Assign responsibilities to all personnel, including leadership, program administrators, employees, and relevant departments, to ensure everyone understands their roles in managing a PPE program and complying with established policies and procedures.



Selection of appropriate PPE



Provide a guide on the various types of PPE used in the laboratory and the method for selecting them. Additional information would include details describing PPE fitting, applicable standards (e.g., OSHA), and procurement.



PPE training and competency assessments

Outline educational requirements to ensure the correct use of PPE. Define the personnel to be trained, frequency of training and assessments, training content, document control, and record keeping. Include laboratory-specific training and competency assessment forms.



PPE maintenance

Describe the maintenance of PPE, including the inspection process, care, cleaning, repair, and proper storage.



PPE program review

Create a plan to monitor the effectiveness of the PPE program periodically through document reviews and assessments of established procedures (e.g., PPE selection and use in the laboratory). Include assessment forms that are specific to your laboratory's PPE program.



Laboratories can consult this [Guide to Designing an Effective PPE Program](#) and this printable [PPE Program Assessment Template](#) for further tips on developing a PPE program.



Glossary

aerosol: fine, small liquid or solid droplets or particles <100 µm in diameter, invisible to the naked eye

barrier: any method used to separate persons from any hazardous material being used

burn rate: the average rate of use and the number of persons using

competency assessment: measurement of a person's ability to perform a task

decontamination: the removal of dangerous chemical, biological, or radiological substances from or the neutralizing of them on a person, object, or area

doffing: removing PPE in a way that avoids self-contamination

donning: putting on PPE properly to achieve the intended protection and minimize the risk of exposure

filtering facepiece respirator: a disposable air-purifying respirator that protects by filtering particles out of the air the user breathes.

forecast: to predict something, often based on knowledge, experience, or research

hazard: anything that has the potential to cause an injury or illness

hazard assessment: a way to identify potential hazards then evaluate and manage the risks associated with them

hazardous waste: any waste that can be harmful to human health or the environment

impermeable: not allowing gas or liquid to pass through

inventory management: a process for ordering, storing, and using supplies

laboratory coat: an outer garment with buttons and cuffed sleeves worn to protect clothing from substances

microlearning: a small unit of information in an easy-to-understand format

non-specialty protective footwear: a shoe type that OSHA defines as exempted and not designed for special use on the job

personal protective equipment (PPE): specialized clothing and equipment designed to minimize direct exposure to hazards or hazardous materials

procedure/activity-specific risk assessment: a process to evaluate the probability and consequences of exposure to a given hazard occurring while performing specific tasks, with the intent to reduce the risk by establishing the appropriate hazard controls to use



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PPE procurement: the process of identifying which PPE and laboratory supplies are needed, how much stock must be kept on hand, and how to work with vendors to ensure access to the required PPE and laboratory supplies

respirators: respiratory protection devices that based on their designs, provide different levels of respiratory protection

risk: a combination of both the likelihood of an event occurring and the consequence of it

risk assessment: a process to evaluate the probability and consequence of exposure to a given hazard, with the intent to reduce the risk by establishing the appropriate hazard controls to use

risk management: a continuous process to identify, assess or evaluate, control, and monitor risks

sanitary: clean and free from dirt

site-specific risk assessment: a process to evaluate the probability and consequence of exposure to a given hazard in a specific location or environment, with the intent to reduce the risk by establishing the appropriate hazard controls to use

surge capacity: the ability to evaluate and rapidly handle a sudden increase in supplies

wraparound gown: laboratory wear that overlaps in the back to provide complete coverage

Additional Resources

OSHA PPE Guidance

1. Occupational Safety and Health Administration, U.S. Department of Labor. Personal Protective Equipment. Accessed March 8, 2023. <https://www.osha.gov/personal-protective-equipment>
2. Occupational Safety and Health Administration, U.S. Department of Labor. Personal Protective Equipment OSHA 3151-02R. Accessed March 8, 2023. <https://www.osha.gov/sites/default/files/publications/osha3151.pdf>

PPE Selection

3. Occupational Safety and Health Administration, U.S. Department of Labor. OSHA Fact Sheet: Personal Protective Equipment. 2006. Accessed March 8, 2023. <https://www.osha.gov/sites/default/files/publications/ppe-factsheet.pdf>
4. National Emerging Special Pathogens Training and Education Center. Personal Protective Equipment (PPE) Resources. Accessed March 8, 2023. <https://netec.org/education-training/covid-19-educational-resources-training/personal-protective-equipment-ppe-for-covid-19/>



5. Centers for Disease Control and Prevention. Personal Protective Equipment: Questions and Answers. Reviewed March 26, 2020. Accessed March 8, 2023. <https://www.cdc.gov/oralhealth/infectioncontrol/faqs/personal-protective-equipment.html>
6. National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention. Limiting Heat Burden While Wearing Personal Protective Equipment (PPE). Reviewed June 18, 2020. Accessed March 8, 2023. <https://www.cdc.gov/niosh/topics/heatstress/heatburden.html>

Respiratory Protection

7. National Personal Protective Technology Laboratory, Centers for Disease Control and Prevention. The Respiratory Protection Information Trusted Source. Reviewed March 21, 2022. Accessed March 8, 2023. https://www.cdc.gov/niosh/npptl/topics/respirators/disp_part/respsource.html
8. Occupational Safety and Health Administration, U.S. Department of Labor. Respiratory Protection. Accessed March 8, 2023. <https://www.osha.gov/respiratory-protection>
9. Occupational Safety and Health Administration, U.S. Department of Labor. Respirator Selection. Accessed March 8, 2023. <https://www.osha.gov/respiratory-protection>

PPE Training Documentation

10. Total Medical Compliance. Personal Protective Equipment (PPE) Training Record. Accessed March 8, 2023. <https://www.totalmedicalcompliance.com/wp-content/uploads/WebinarPPETrainingRecordJan2021FILLABLE.pdf>

PPE Competency Assessments

11. Agency for Healthcare Research and Quality. Personal Protective Equipment (PPE) Competency Validation Tool. Reviewed May 2022. Accessed March 8, 2023. [Personal Protective Equipment \(PPE\) Competency Validation Tool | Agency for Healthcare Research and Quality \(ahrq.gov\)](https://www.ahrq.gov/ppe-competency-validation-tool)
12. Pharmerica. Personal Protective Equipment (PPE) Competency Validation. Accessed March 8, 2023. <https://pharmerica.com/wp-content/uploads/2020/11/PPE-CompetencyValidationCOVID19.pdf>



PPE Supply Management

13. Centers for Disease Control and Prevention. Conserving Supplies of Personal Protective Equipment in Healthcare Facilities during Shortages. Reviewed May 8, 2023. Accessed March 8, 2023.
<https://www.cdc.gov/niosh/topics/pandemic/conserving.html#%3A%7E%3Atext%3DConserving%20Supplies%20of%20Personal%20Protective%20Equipment%20in%20Healthcare%2Cconservations%20strategies%20...%204%20For%20More%20Information%20>
14. Centers for Disease Control and Prevention. CDC Clinician Outreach and Communication Activity: Strategies for Optimizing PPE Supply during Shortages. Accessed March 8, 2023.
<https://emergency.cdc.gov/newsletters/coca/010521.htm>

Risk Management and Assessment

15. Centers for Disease Control and Prevention. Biosafety Resources and Tools. Accessed April 16, 2023. <https://www.cdc.gov/safelabs/resources-tools/biosafety-resources-and-tools.html>
16. Centers for Disease Control and Prevention. Biosafety Symposium- Risk Assessment. Accessed April 23, 2023. [Risk Assessment: The Foundation of Every Good Biorisk Management System \(cdc.gov\)](#)
17. Association of Public Health Laboratories. Template for Public Health Laboratory Risk Assessment for Ebola Virus Disease (EVD) Testing. Accessed April 23, 2023. [Risk Assessment: The Foundation of Every Good Biorisk Management System \(cdc.gov\)](#)
18. Association of Public Health Laboratories. Template for Public Health Laboratory Risk Assessment for Zika Virus Testing. Accessed April 23, 2023.
[APHL Risk Assessment Template for Zika Virus Testing.pdf](#)
19. Association of Public Health Laboratories. Risk Assessment Best Practices. Accessed April 23, 2023. [APHL Risk Assessment Best Practices and Examples.pdf](#)