



The Right PPE for Processing Technicians:

What You Wear and How You Wear It Matters

BY JACQUELINE DALEY, HBSC, MLT, CIC, CSPDS, FAPIC, SOUTH DIVISION DIRECTOR, INFECTION PREVENTION—PROVIDENCE ST. JOSEPH, IRVINE, CALIF

This series of self-study lesson plans was developed by HSPA. Certified Registered Central Service Technician (CRCST) lessons provide members and certification holders with ongoing education on core Sterile Processing-related topics and processes. Purdue University's Extended Campus and HSPA both offer grading opportunities.

Earn Continuing Education Credits

Online: Visit www.myhspa.org for online grading.

By mail: For written grading of individual lessons, send completed quiz and \$15 to: Purdue Online – Central Service Young Hall, Room 405 155 S. Grant St. West Lafayette, IN 47907

Scoring: Each quiz with a passing score is worth two continuing education (CE) credits toward your CRCST recertification (12 credits).

Subscription series: Purdue Extended Campus offers an annual mail-in or online self-study lesson subscription for \$75 (six specific lessons worth two credits each toward CRCST recertification of 12 credits). Call 765.494.0959 for details.

More information: HSPA provides online grading service for any of the Lesson Plan varieties. **Note: Purdue University provides grading services ONLY for CRCST and CIS lessons.** Direct any questions about online grading to HSPA at 312.440.0078. Questions about written grading are answered by Purdue University at 765.494.0959.

LEARNING OBJECTIVES

1. Review the importance of the use of PPE when processing contaminated medical devices and learn the regulations, standards and guidelines that apply to PPE
2. Understand the exposure risks in the decontamination area
3. List mitigation strategies to lower the risk of exposure in processing areas

Personal protective equipment (PPE) is an important staple. PPE is used to protect healthcare workers from infectious diseases transmitted through contact, droplet and airborne routes and from exposure to blood and other bodily fluids. The recent and still ongoing SARS-CoV-2 pandemic highlighted the importance of PPE along with identifying gaps in the supply chain. Shortages left healthcare facilities scrambling to purchase PPE from non-traditional sources and manufacturers of PPE and accepting donations in order to maintain Operating Room (OR) and Sterile Processing (SP) operations, including endoscopies and caring for patients under isolation precautions. For these and other reasons, the Emergency Care Research Institute (ECRI) identified disposable gowns as having insufficient barrier protection and therefore putting wearers at risk in

their Top 10 Health Technology Hazards for 2022.¹

Objective 1: Review the importance of the use of PPE when processing contaminated medical devices and learn the regulations, standards and guidelines that apply to PPE

PPE is specialized clothing or equipment worn for protection against hazardous materials, bloodborne pathogens and other potentially infectious materials (OPIM).^{2,3} Examples of PPE used by healthcare workers include gloves, eye protection (face shields, goggles), face masks and respirators.

The Occupational Safety and Health Administration (OSHA), defines OPIM as human bodily fluids such as semen, vaginal secretions, cerebrospinal fluid, synovial fluid, bodily fluids that are visibly contaminated with blood, and all bodily fluids in situations where it is

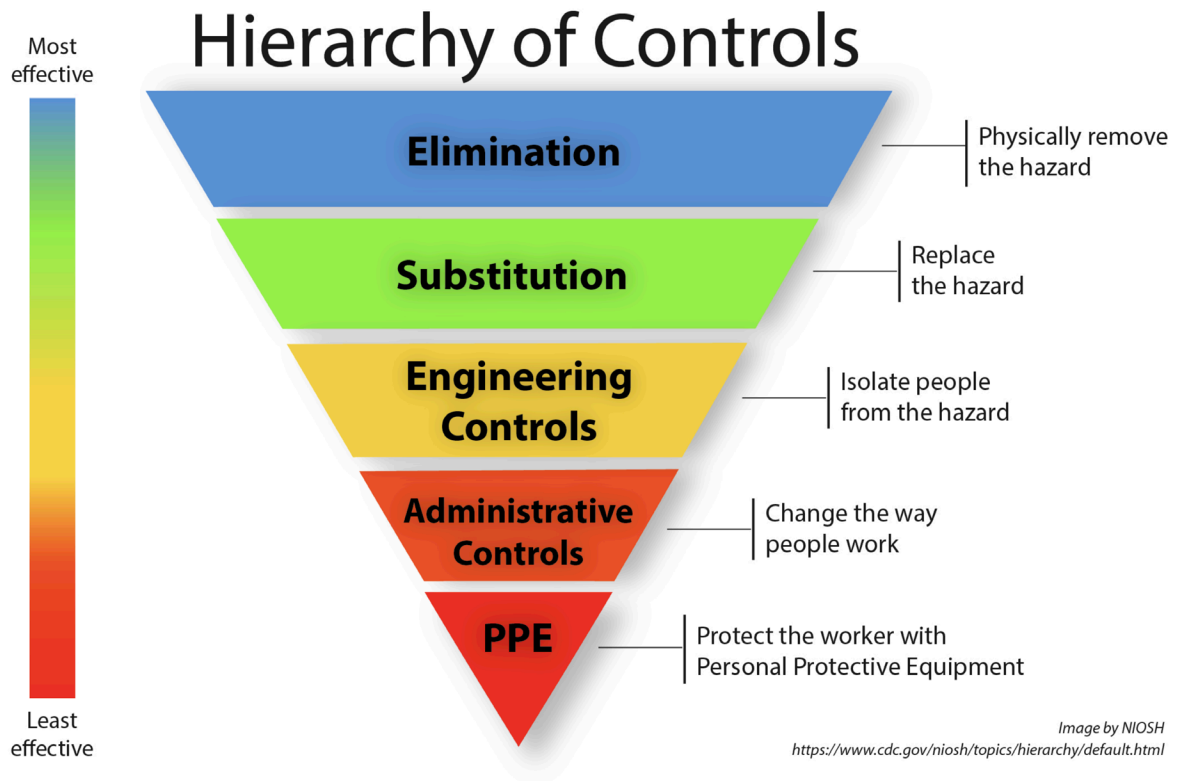


Figure 1: Hierarchy of Controls, according to the National Institute for Occupational Safety and Health
(Image credit: Centers for Disease Control and Prevention, NIOSH; Public Domain)

difficult or impossible to differentiate between bodily fluids.³ SP technicians are exposed to bloodborne pathogens and OPIM on a daily basis while processing contaminated instruments, devices and equipment.

The Centers for Disease Control and Prevention (CDC) National Institute for Occupational Safety and Health (NIOSH) Hierarchy of Controls provides actions to be taken to best control exposures.⁴ (See **Figure 1**) The hierarchy defines five critical levels of action to reduce or remove hazards. PPE is noted to be the least effective of all the components considered critical. Other steps are elimination of the hazard at the source, substitution

with a safer alternative to the source of the hazard, engineering controls to reduce or prevent workers from coming into contact with hazards, and administrative controls to establish work practices that reduce the duration, frequency or intensity of exposure to hazards. As noted in the hierarchy, elimination and substitution can be the most difficult actions to adopt into an existing process, especially in areas such as instrument and device processing.

Regulations, standards and guidelines dictate the why, how and where to use PPE in healthcare settings, including areas where contaminated medical devices and instruments are processed

for subsequent use. PPE regulations issued by governmental agencies as well as standards and guidelines developed by non-profit organizations and associations include the:

Occupational Safety and Health Administration (OSHA)

The OSHA Bloodborne Pathogens Standard (29 CFR 1910.1030) requires each employer having employees with occupational exposures to establish a written exposure control plan. That is, the standard protects workers who can reasonably be anticipated to come into contact with blood or OPIM as a result of doing their job duties.³



U.S. Food and Drug Administration (FDA)

All PPE that is intended for use as a medical device must follow FDA regulations and meet specific performance standards for protection. This includes surgical masks, N95 respirators, medical gloves and gowns.⁵

Centers for Disease Control and Prevention (CDC)

Adhering to Standard Precautions and transmission-based precautions in healthcare settings is recommended by the CDC and protects workers from a wider range of infectious diseases. Standard Precautions are applied to all patients regardless of infection status and the use of certain types of PPE is based on anticipated exposure. Transmission-based precautions are used for contact-, droplet-, and airborne-transmissible diseases in addition to recommendations for Standard Precautions.⁶

Association of periOperative Registered Nurses (AORN)

Perioperative personnel, including device and instrument processing technicians, must wear PPE when exposure to blood, bodily fluids or OPIM is anticipated.⁷

The Joint Commission (TJC)

Healthcare accrediting bodies expect the use of PPE. Prominent among them is TJC, which expects that “The organization uses Standard Precautions, including the use of personal protective equipment, to reduce the risk of infection.”⁸

Association for the Advancement of Medical Instrumentation (AAMI)

AAMI, a standards development organization accredited by the American National Standards Institute (ANSI),

issues guidelines to promote the safe and effective use of health technology, including PPE. The standards relevant to PPE are ANSI/AAMI ST79:2017 & 2020 Amendments A1, A2, A4 (Consolidated Text) *Comprehensive guide to steam sterilization and sterility assurance in health care facilities* and ANSI/AAMI PB70:2022 *Liquid barrier performance and classification of protective apparel and drapes intended for use in health care facilities*.

ST79 recommends compliance with the OSHA Bloodborne Pathogens Standard. When personnel are performing decontamination activities, PPE is required to eliminate or minimize risk of exposure to bloodborne pathogens and other disease-producing organisms.²

PB70 is a device manufacturer standard that sets minimums for the performance of surgical gowns, isolation gowns, other gowns, other protective apparel, surgical drapes, and drape accessories designed to protect healthcare workers during surgery and other healthcare procedures. This is a valuable resource for users of these products as well as those tasked with purchasing them as it provides defined levels of performance that allow for informed decision.⁹

ASTM International

Surgical and isolation gowns are used as part of a PPE ensemble for processing contaminated medical devices and equipment. ASTM International, previously known as the American Society for Testing and Materials, has developed two standards to address these items: ASTM F2407/F2407M-23a “Standard Specification for Surgical Gowns Intended for Use in Healthcare Facilities” and ASTM F3352/F3352M-23b “Standard Specification for Isolation Gowns Intended for

Use in Healthcare Facilities.” These standards address the performance of surgical gowns and isolation gowns, respectively, designed to preserve the sterile field and/or protect healthcare workers against exposure to blood, bodily fluids and OPIM during surgery and other healthcare procedures.¹⁰ Both specifications establish uniform testing and reporting requirements for gown manufacturers in order to provide information to end users to support making informed decisions in the selection and purchase of surgical gowns according to the anticipated exposures.^{10,11} This information is also useful for helping end users comply with the OSHA Bloodborne Pathogens Standard.

Objective 2: Understand the exposure risks in the decontamination area

The risk to device and instrument processing technicians working in the decontamination area is very real but can be unnoticed, unrealized or taken for granted. Healthcare workers, including SP technicians, have complained about poor fit, discomfort and an inability to don (put on) and doff (remove) PPE without contaminating themselves. These issues place processing technicians at risk for exposure to antibiotic-resistant organisms (AROs), including new and emerging resistant strains that can be harbored on surfaces in the decontamination area. The CDC has designated specific AROs as Urgent Threats, including Carbapenem-resistant *Acinetobacter*, *Candida auris*, *Clostridioides difficile*; Carbapenem-resistant Enterobacteriaceae; and drug-resistant *Neisseria gonorrhoeae*.¹² Instruments and devices not properly treated at the point of use may result in drying of clinical soil and require extra



handling, increasing the risk of exposure to the processing technician.

Another source of risk was demonstrated in a pilot project study by Ofstead & Associates, which found that droplets traveled three to five feet from the sink, PPE was splashed during most activities, and PPE failed to prevent exposure even when properly donned.¹³ A second study, also conducted by Ofstead & Associates, used a study protocol where moisture detection paper was placed on PPE. The results were eye-opening. The researchers found that manual cleaning of devices generated substantial splash, drenching technicians and the environment with droplets that traveled more than seven feet. These two studies emphasize the risk of exposure posed to processing technicians in the decontamination area.¹⁴

Objective 3: List mitigation strategies to lower the risk of exposure in processing areas

Processing technicians, specifically those working in the decontamination area, are at a higher risk for exposure to blood, bodily fluids and OPIM. ANSI/AAMI ST79 states that PPE is required for personnel performing decontamination activities.² For the PPE to be effective, it must be worn correctly and consistently. However, in the Ofstead & Associates studies previously cited, even when processing technicians properly donned and doffed their PPE, skin exposures occurred.^{13,14} The authors concluded that better PPE is needed, along with engineering controls to reduce the risk of exposure associated with the potential dispersal of contaminated fluids.

Armed with these study findings, regulations, standards and guidelines, mitigation strategies that can be used to protect processing technicians include:

1. *Conduct a risk or workplace hazard/risk assessment.* The hazard/risk assessment should be conducted in collaboration with your infection preventionists and be a part of the annual infection prevention risk assessment required by The Joint Commission.⁸ Processing technicians' PPE requirements will vary depending on the specific tasks being performed and the location (e.g., hospital decontamination area compared to a doctor's office). Management of the decontamination area must ensure that the proper PPE is purchased and available, with input from SP technicians, to reduce exposure risk to skin and mucous membranes.
2. *The facility must have an exposure control plan that includes the decontamination area.* The plan must include the activities and potential hazards that may be encountered while working in this area.³ This will be determined as part of the risk assessment.
3. *Worker training should include competency on the proper use of PPE and the actions to take if an exposure occurs.* OSHA's Bloodborne Pathogens Standard requires employers to provide training to workers required to use PPE.³ This includes training on what equipment is necessary, when and how they must use the equipment, and correctly donning and doffing the PPE.¹⁶ Gloves are the last to be put on, after gowns, masks, head coverings and face shields. A common mistake made when putting on PPE is donning one's gloves before the mask. Personnel should also be trained on proper PPE disposal, how to recognize tasks that may involve exposure, and the methods to reduce exposure,


including appropriate engineering controls, work practices and PPE.³ Training should include what to do if a technician notices a tear or hole in their PPE or if an exposure (skin, eyes, nose or mouth) to suspected bodily fluid occurs. Visibly dirty or torn PPE should be removed immediately and replaced with new PPE. All potential exposures should be promptly reported to a supervisor, and the technician should await further instructions.

PPE includes the use of utility gloves (medical exam gloves are not to be used) fitted at the wrist and long enough to cover the gown cuff, liquid-resistant shoe covers, liquid-resistant protective apparel, fluid-resistant face masks (fit-tested N95 respirators may be needed based on the risk assessment) to cover the nose and mouth, eye protection (goggles, face shield), and head covers.² PPE should be properly fitted and not restrictive to breathing or movement to maximize protection during use.²

4. *Conduct regular PPE compliance audits and provide feedback to processing technicians.* Healthcare facility infection preventionists have the expertise to assist with auditing and should be consulted. Technician feedback should be solicited.
5. *Purchase PPE that meets regulatory requirements,^{3,5} ASTM standard test specifications,^{10,11} and AAMI PB70 classification.⁹* Gown terminology varies based on usage, and it is critical to understand the differences. Gowns include protective apparel, decontamination gowns and full-coverage gowns. The bottom line is this: a gown should never be assumed to be appropriate for use by technicians working in the decontamination area.



Conclusion

The use of PPE is an essential part of infection prevention in the decontamination areas of healthcare facilities. OSHA regulations require that PPE be provided to all workers with the potential for exposure to blood, bodily fluids and OPIM.³ The NIOSH Hierarchy of Controls places PPE as the least effective critical strategy for preventing exposure risk.⁴ This, however, does not negate the importance of PPE use, particularly in decontamination areas. Supply chain disruption during the SARS-CoV-2 pandemic highlighted the importance of PPE and the use of products from non-traditional sources. With proper selection, purchasing and training for appropriate and consistent use, processing technicians can be confident in their PPE. Applied consistently, such mitigation strategies will minimize the risk of exposure. 

REFERENCES

1. Top 10 Health Technology Hazards for 2022. ECRI Executive Brief. www.ecri.org/2022hazards.
2. Association for the Advancement of Medical Instrumentation. ANSI/AAMI ST79:2017 & 2020 Amendments A1, A2, A3, A4 (Consolidated Text) *Comprehensive guide to steam sterilization and sterility assurance in health care facilities*.
3. OSHA Bloodborne Pathogens Standard. 29 CFR 1910.1030. <https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.1030>. Accessed August 12, 2023.
4. CDC NIOSH Hierarchy of Controls. <https://www.cdc.gov/niosh/topics/hierarchy/default.html>. Last reviewed January 17, 2023.
5. FDA. Personal Protective Equipment for Infection Control. <https://www.fda.gov/medical-devices/general-hospital-devices-and-supplies/personal-protective-equipment-infection-control>. Accessed August 13, 2023.
6. CDC. 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings. <https://www.cdc.gov/infectioncontrol/guidelines/isolation/index.html>. Last updated July 11, 2023.
7. "Guideline for Transmission-Based Precautions." In Association of periOperative Registered Nurses (AORN) *Guidelines for Perioperative Practice, 2023*.
8. The Joint Commission. Infection Prevention chapter. 2023.
9. Association for the Advancement of Medical Instrumentation. ANSI/AAMI PB70:2022 *Liquid barrier performance and classification of protective apparel and drapes intended for use in health care facilities*.
10. ASTM International. F2407/F2407M-23a "Standard Specification for Surgical Gowns Intended for Use in Healthcare Facilities," 2023.
11. ASTM International. F3352/F3352M-23b "Standard Specification for Isolation Gowns Intended for Use in Healthcare Facilities," 2023.
12. CDC Antibiotic Resistance Threats in the United States, 2019. <https://www.cdc.gov/drugresistance/pdf/threats-report/2019-ar-threats-report-508.pdf>. Accessed August 13, 2023.
13. Ofstead, CL et. al. "Droplet Dispersal in Decontamination Areas of Instrument Reprocessing Suites." *American Journal of Infection Control*, vol. 50, issue 2 (2022) 126-132.
14. Ofstead, CL et. al. "Splash Generation and Droplet Dispersal in a Well-Designed, Centralized High-Level Disinfection Unit." *American Journal of Infection Control*, vol. 50, issue 11 (2022) 1200-1207.
15. CDC Sequence for Donning and Doffing Personal Protective Equipment (PPE). <https://www.cdc.gov/hai/pdfs/ppe/ppeposter148.pdf>. Accessed August 16, 2023.



CRCST Self-Study Lesson Plan Quiz

The Right PPE for Processing Technicians: What You Wear and How You Wear It Matters

Lesson No. CRCST 193 (Technical Continuing Education – TCE) • Lesson expires December 2026

- The CDC NIOSH Hierarchy of Controls has five levels of actions to reduce or remove hazards based on effectiveness. Which is the least effective control measure?
 - Elimination
 - Substitution
 - Personal protective equipment (PPE)
 - Engineering controls
- Which types of PPE do processing technicians wear in the decontamination area?
 - Fluid-resistant protective attire with sleeves, utility gloves, eye protection, fluid-resistant surgical masks and fluid-resistant shoe covers
 - Surgical masks, N95 respirators, medical gloves and gowns
 - Protective clothing, helmets, gloves, face shields, goggles, facemasks and/or respirators
 - All the above
- Which of the following issue regulations pertaining to PPE?
 - AAMI and ANSI
 - OSHA and FDA
 - ASTM and AORN
 - OSHA and ANSI
- What is the purpose of wearing PPE in the decontamination area of the Sterile Processing department?
 - To protect against droplet and airborne exposure
 - To prevent exposure to other potentially infectious materials (OPIM)
 - To prevent exposure to hazardous chemicals
 - All the above
- PPE should be worn in the decontamination area only when there is a risk of exposure to hazardous chemicals, blood or OPIM.
 - True
 - False
- A common mistake made when donning (putting on) PPE is:
 - Putting on the mask after gloves
 - Putting on gloves after putting on the gown
 - Putting on gloves after putting on the mask
 - None of the above
- What should be done if an employee notices a tear or hole in their PPE while working in the decontamination area?
 - Continue working as long as the tear or hole is small and virtually undetectable
 - Remove it immediately, replace it with new PPE and promptly report the incident to a supervisor
 - Place new PPE on top of the torn PPE for added protection
 - None of the above
- Risks to technicians working in the decontamination area include:
 - Exposure to blood, bodily fluids and OPIM
 - Exposure to drug-resistant organisms and other pathogens
 - Manual cleaning that generates droplets that travel at least seven feet from the sink
 - All the above
- Strategies to mitigate exposure risks include training and competency verification on the use of PPE and compliance with the OSHA requirement for an exposure control plan.
 - True
 - False
- PPE should be removed in the decontamination area:
 - In an order that minimizes the potential for self-contamination
 - In any order that is most comfortable for the employee
 - In any order, as long as it is removed before leaving the decontamination area
 - None of the above
- PPE is used to protect workers against:
 - Contact transmission
 - Droplet transmission
 - Airborne transmission
 - All the above
- Regulations, standards and guidelines dictate:
 - Why, how and where to use PPE
 - The sizes and quantities of PPE to keep on hand during a pandemic
 - AORN's Five Levels of Hierarchy
 - How frequently PPE should be changed during each shift
- Which organization has set standards for surgical and isolation gowns?
 - AORN
 - OSHA
 - TJC
 - ASTM International
- The AAMI document that addresses barrier performance is:
 - ST91
 - ST108
 - PB70
 - CFR 29
- Management of the decontamination area includes:
 - Ensuring proper PPE is purchased
 - Soliciting technician input on PPE to reduce exposure
 - Having an exposure control program
 - All the above

Request for paper/pencil scoring

(Please print or type information)

- I have enclosed the scoring fee of \$15. (Please make checks payable to Purdue University. We regret that no refunds can be given.)
- Check here if you have a change of address.
- Check here if you wish to have your results emailed to you.

Detach quiz, fold, and return to:

Purdue Online – Central Service
Young Hall Room 405
155 S. Grant St.
West Lafayette, IN 47907

Name

Mailing Address (Be sure to include apartment number or post office box.)

City

State/Province

Zip Code/Postal Code

Daytime Telephone

HSPA Membership Number

Email Address

If your name has changed in the last 12 months, please provide your former name. Purdue University is an equal access/equal opportunity institution.