

Chapter 4: Infection Control and Precautions

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Overview of Routine Cleaning and Maintenance for a Healthy School Environment

One of the most straightforward ways to create a healthy school environment is to improve everyday maintenance to keep school facilities clean and running smoothly and safely. This section addresses regular cleaning and pest management and helps schools assess and improve their operations and maintenance programs for their facilities.

Routine Cleaning Topics (Click on blue highlighted text for link to the topic)

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Why It's Important

- School environments are healthier when they are kept clean and well maintained.

- **Unsanitary conditions attract insects and vermin, and irritants and allergens found in dust and dirt can have a negative impact on student health and performance in schools.**
- **Indoor air pollutants and allergens related to poor cleaning practices contribute to increased respiratory and asthma symptoms among children and adults.**
- **Regular and thorough cleaning and building maintenance can prevent pest problems, minimize irritants and allergens and create healthier learning and working environments for children and staff**

What You Can Do

- **A good operations and maintenance plan includes procedures for cleaning all parts of the school facility and maintaining the entire building infrastructure: the foundation, exterior and interior walls, windows and doors, and roofing.**
- **Refer to and follow your state's relevant environmental health policies and emergency management protocols when conducting cleaning and maintenance activities.**
- **[Practice Effective Cleaning and Maintenance](#) is a component of (Environmental Protection Agency's (EPA) model school environmental health program that provides information to help schools create and maintain clean productive learning environments.**

Resources

EPA and Federal Partners

- **[ENERGY STAR for K-12 School Districts](#) describes EPA's partnership with schools across the country to provide technical support, guidance on financing options and recognition for schools wanting to use energy more efficiently. ENERGY STAR has coordinated with EPA's Indoor Air Quality program to address the overlap between energy efficiency upgrades and indoor environmental quality, and it has launched an energy performance rating tool in schools.**
- **[Green Power Partnership](#) is a voluntary EPA program that helps organizations lower the transaction costs of buying green power, reduce their carbon footprint and communicate their leadership to key stakeholders. Includes information on technical support, tools and resources.**
- **[Integrated Pest Management](#) by EPA provides information to reduce children's risk from and exposure to pesticide. IPM uses commonsense strategies to reduce sources of food, water and shelter for pests in school buildings and grounds.**
- **[Operating and Maintaining EnergySmart Schools: Web-Based Training](#) by the U.S. Department of Energy introduces energy efficiency concepts, presents energy-saving strategies and helps building managers develop and implement a plan for**

energy efficiency in schools. The training includes a test and opportunity for certification.

- [Planning Guide for Maintaining School Facilities](#) provides an introduction to school facility maintenance and includes chapters on facility audits, managing staff and contractors, evaluating maintenance efforts and more. The guide was written by the National Forum on Education Statistics and sponsored by the U.S. Department of Education's National Center for Education Statistics.

National Organizations

- [School Cleaning and Maintenance Practices: Resource List](#) by the National Clearinghouse for Educational Facilities offers an annotated list of links, books and journal articles on custodial standards and procedures, equipment, safety and product directories for the cleaning and maintenance of schools and colleges.
- [School Facilities Management: Resource List](#) by the National Clearinghouse for Educational Facilities offers an annotated list of links, books and journal articles on the operations and management of school buildings and campus facilities.
- [Sustainable Sites Initiative™](#) (SITES™) is an interdisciplinary effort to create voluntary national guidelines and performance benchmarks for sustainable land design, construction and maintenance practices. SITES™ is led by the American Society of Landscape Architects, the Lady Bird Johnson Wildflower Center at The University of Texas at Austin and the United States Botanic Garden.

State and Local Entities

- [Florida - Brevard County Public Schools Office of Environmental Health and Safety](#) describes the efforts of the custodial services team and presents tools and resources on a wide range of topics, such as asbestos, fire safety, hazardous materials, indoor air quality, integrated pest management, sanitation and more.
- [Kentucky Green and Healthy Schools](#) is a voluntary program to empower students and staff with the tools needed to take action and make their school operate at peak efficiency.
- [Maine School Safety](#) on the Maine Department of Education website includes a draft plan and checklists for maintenance, operations, grounds, custodial and vehicle services.
- [Wastebusters Green Cleaning Video](#) by the Connecticut Department of Energy and Environment demonstrates the hazards of common cleaning products while showing the benefit and effectiveness of using green cleaners.

Retrieved from <https://www.epa.gov/schools-healthy-buildings/overview-routine-cleaning-and-maintenance-healthy-school-environment#why>

Blood and Body Fluid Precautions

Worker protections against occupational exposure to infectious diseases

Comparing the universal precautions of the Occupational Safety and Health Administration's (OSHA) Bloodborne Pathogens standard to the standard precautions and the transmission-based precautions used by healthcare practitioners for infection control

Center for Disease Control and Prevention (CDC)/ Amanda Mills

The Bloodborne Pathogens standard (29 CFR 1910.1030) and CDC's recommended standard precautions both include personal protective equipment, such as gloves, gowns, masks, eye protection (e.g., goggles), and face shields, to protect workers from exposure to infectious diseases.

OSHA standards for bloodborne pathogens (BBP, [29 CFR 1910.1030](#)) and personal protective equipment (PPE, [29 CFR 1910 Subpart I](#)) require employers to protect workers from occupational exposure to infectious agents. The BBP standard applies when workers have occupational exposure to human blood or other potentially infectious materials (OPIM), as defined in paragraphs (a) and (b) of the BBP standard, and requires the use of universal precautions to prevent contact with these materials.¹ Adhering to standard and transmission-based precautions in healthcare settings is recommended by Centers for Disease Control and Prevention (CDC), and protects workers from a wider range of infectious disease hazards than the BBP standard.

Employers and workers should be familiar with several key approaches to infection control, including universal precautions (UP), standard precautions (SP), and transmission-based precautions.

- Universal precautions (UP), originally recommended by the CDC in the 1980s, was introduced as an approach to infection control to protect workers from HIV, HBV, and other bloodborne pathogens in human blood and certain other body fluids, regardless of a patient's infection status.² UP is an approach to infection control in which all human blood and certain human body fluids are treated as if they are known to be infectious. Although the BBP standard incorporates UP, the infection control community no longer uses UP on its own.
- Standard precautions (SP), introduced in 1996 in the CDC/Healthcare Infection Control and Prevention Advisory Committee's "1996 Guideline for Isolation Precautions in Hospitals," added additional infection prevention elements to UP in order to protect healthcare workers not only from pathogens in human blood and certain other body fluids, but also pathogens present in body fluids to which UP does not apply. SP includes hand hygiene; the use of certain types of personal protective equipment (PPE) based on anticipated exposure; safe injection practices; and safe management of contaminated equipment and other items in the patient environment. SP is applied to all patients even when they are not known or suspected to be infectious.

- Transmission-based precautions (TBP) for contact-, droplet-, and airborne-transmissible diseases augment SP with additional controls to interrupt the route(s) of transmission that may not be completely interrupted using SP alone.³ The different types of TBP are applied based on what is known or suspected about a patient's infection.

The BBP standard requires the use of UP, and extends UP to protect workers against pathogens found in saliva during dental procedures and body fluids in situations where it is difficult or impossible to differentiate between body fluids (e.g., vomit mixed with blood).

During recent outbreaks of emerging infectious diseases, other body fluids to which UP and the BBP standard do not apply have been identified as potential sources of worker exposures and infections. For example, the CDC identified contact with urine, saliva, feces, vomit, and breast milk as potential sources of Ebola virus exposure.^{4, 5} Studies also found that urine of individuals with Zika can contain high concentrations of infectious virus that could persist in urine longer than it is detectable in serum, a component of blood.^{6, 7} (Note that exposure to urine has not been a recognized cause of Zika transmission.)

By using SP in healthcare settings, additional protection is provided by expanding UP to protect workers where UP and the BBP standard do not apply. For example, SP applies, without limitation, to urine, feces, nasal secretions, sputum, vomit, and other body fluids that may be potential sources of worker exposure to infectious agents. SP assumes that every person is potentially infected or colonized with an organism that could be transmitted in the healthcare setting. Since SP was developed to integrate principles of UP and body substance isolation,⁸ the infection prevention and control methods used under SP encompass what employers should already be implementing to protect workers against exposures under the BBP standard and its requirements for use of UP. Other OSHA requirements, such as the PPE standards (see [29 CFR 1910 Subpart I](#)) and [Section 5\(a\)\(1\), the General Duty Clause](#), of the Occupational Safety and Health Act, 29 USC 654, also may apply.⁹

The following tables highlight key distinctions among UP as originally written, the BBP standard (which incorporates UP), and SP. Table 1 outlines the body fluids and other materials to which each applies.

Table 1. Body fluids to which UP, the BBP standard, and SP apply

Exposure to...	Covered by		
	UP (as originally defined)	BBP	SP
Blood			
Semen ³			
Vaginal secretions ³			
Cerebrospinal fluid ³			
Synovial fluid ³			

Pleural fluid³

Pericardial fluid³

Peritoneal fluid³

Amniotic fluid³

Saliva in dental procedures³

Any body fluid that is visibly contaminated with blood³

All body fluids in situations where it is difficult or impossible to differentiate between body fluids³ 10

Urine^{6, 11}

Feces¹⁰

Nasal secretion¹⁰

Sputum¹⁰

Vomit¹⁰

Breast milk¹⁰

Saliva, other than in dental procedures¹⁰

Table 2 compares selected controls, actions and other measures for the protection of workers against exposure to blood and other possible infected material (OPIM) and for the protection of workers against exposure to material that is not blood or OPIM. Note that Table 2 discusses only selected provisions of the BBP standard, as well as only selected elements of SP and TBP, and is not intended to describe all provisions with which employers may need to comply. The General Duty Clause of the Occupational Safety and Health Act and additional OSHA standards, including those for personal protective equipment in 29 CFR 1910 Subpart I, also may apply.

Table 2. Selected elements of infection prevention and control under BBP, SP, and TBP

Control, action or other measure	To protect workers against exposure to...	
	Blood and OPIM ³	Material that is not blood or OPIM, including body fluids not covered under OPIM (e.g., urine ⁶ and feces)
Blood and body fluid precautions for all patients, regardless of infection status	BBP, SP	SP

Exposure control plan and required elements thereof ¹²	BBP	
Patient isolation/placement	TBP	TBP
Hand hygiene	BBP, SP	SP
Safe injection practices	BBP, SP	SP
Safe sharps management/disposal	BBP, SP	SP
Prohibiting eating, drinking, smoking, or application of cosmetics or lip balm and handling of contact lenses in areas where there is a reasonable likelihood of occupational exposure ¹³	BBP	
Separating food and drink from areas where blood and OPIM are present ¹³	BBP	
Prohibiting mouth pipetting and suctioning of blood or OPIM ¹³	BBP	
Safe specimen storage, packaging, shipment ¹³	BBP	
PPE – Gloves, gowns, masks, eye protection (e.g., goggles), face shields	BBP, ¹⁴ SP, TBP	SP, TBP
PPE – Aprons and other protective body clothing	BBP, TBP	TBP
PPE – Surgical caps	BBP, TBP	TBP
PPE – Shoe/boot covers	BBP, TBP	TBP
PPE – N95 or higher respirators for aerosol-generating procedures on patients with suspected or proven infections transmitted by respiratory aerosols	SP, TBP	SP, TBP
PPE – Any additional appropriate equipment to prevent blood or other potentially infectious materials to pass through to or reach the employee's work clothes, street clothes, undergarments, skin, eyes, mouth, or other mucous membranes under normal conditions of use and for the duration of time which the protective equipment will be used. See 29 CFR 1910.1030(d) (3) (i).	BBP	

PPE – Any additional appropriate equipment (i.e., not specifically listed already) to protect workers against transmission of infectious agents	TBP	TBP
Housekeeping and environmental control procedures	BBP, SP	SP
<ul style="list-style-type: none"> ▪ Safe waste management¹³ ▪ Safe laundry management ▪ Soiled patient-care equipment management 	BBP BBP, SP BBP, SP	SP SP SP
Post exposure evaluation and follow-up after occupational exposure to a bloodborne pathogen(s) ¹⁵	BBP	

Worker Training

Employers always should train workers about sources of infectious agent exposure and appropriate precautions for preventing infections. Two of the relevant OSHA standards requiring training are those for PPE and BBP. Under the PPE standards, employers must provide training to workers required to use PPE, including training on what equipment is necessary, when and how they must use the equipment, and how to dispose of the equipment. In addition, where workers are exposed to blood or other potentially infectious materials, employers must provide the training required by the BBP standard, including information about how to recognize tasks that may involve exposure and the methods to reduce exposure, including appropriate engineering controls, work practices, and personal protective equipment.

Additional Resources

- Bloodborne Infectious Diseases: HIV/AIDS, Hepatitis B, Hepatitis C; CDC/NIOSH (2016) <https://www.cdc.gov/niosh/topics/bbp/default.html>
- [Safety and Health Topics page on Bloodborne Pathogens and Needle stick Prevention](#). Occupational Safety and Health Administration, U.S. Department of Labor.
- [Guidelines for Environmental Infection Control in Health-Care Facilities](#). Healthcare Infection Control and Prevention Advisory Committee, Centers for Disease Control and Prevention, U.S. Department of Health and Human Services.
- [NIOSH Bloodborne Infectious Diseases: HIV/AIDS, Hepatitis B, and Hepatitis C page](#). National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention, U.S. Department of Health and Human Services.
- [Respiratory Protection eTool](#). Occupational Safety and Health Administration, U.S. Department of Labor.

- [NIOSH Respiratory Protection page](#). National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention, U.S. Department of Health and Human Services.
- [CDC/NIOSH/OSHA Hospital Respiratory Toolkit](#). National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention, U.S. Department of Health and Human Services; and Occupational Safety and Health Administration, U.S. Department of Labor.
- [Infectious Diseases Rulemaking](#) (RIN: 1218-AC46). Office of Information and Regulatory Affairs, Office of Management and Budget.
- [Standard Precautions and Transmission-Based Precautions](#). Virginia Department of Health.

¹ "Other Potentially Infectious Materials," as defined in the OSHA Bloodborne Pathogens standard (29 CFR 1910.1030(b)), means:

1. The following human body fluids: semen, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, pericardial fluid, peritoneal fluid, amniotic fluid, saliva in dental procedures, any body fluid that is visibly contaminated with blood, and all body fluids in situations where it is difficult or impossible to differentiate between body fluids;
2. Any unfixed tissue or organ (other than intact skin) from a human (living or dead); and
3. HIV-containing cell or tissue cultures, organ cultures, and HIV- or HBV-containing culture medium or other solutions; and blood, organs, or other tissues from experimental animals infected with HIV or HBV.

² The CDC initially defined "universal precautions" as applying to blood and other body fluids containing visible blood. See: CDC (1988). "Update: Universal precautions for prevention of transmission of human immunodeficiency virus, hepatitis B virus, and other bloodborne pathogens in health-care settings. *MMWR Morb Mortal Wkly Rep*, 37(24): 377-82, 87-8." OSHA's Bloodborne Pathogens standard (29 CFR 1910.1030) applies universal precautions to the prevention of contact with blood or other potentially infectious materials (OPIM). See footnote 1 for additional information about OPIM.

³ For additional information about transmission-based precautions for specific infectious agents, see "Part III: Precaution to Prevent Transmission of Infectious Agents" and "Appendix A: Type and Duration of Precautions Recommended for Selected Infections and Conditions" of the HICPAC "[2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings](#)."

⁴ Dixon, M. G., & Schafer, I. J. (2014). Ebola viral disease outbreak—West Africa, 2014. *MMWR Morb Mortal Wkly Rep*, 63(25), 548-51.

⁵ Cardile, A. P., Murray, C. K., Littell, C. T., Shah, N. J., Fandre, M. N., Drinkwater, D. C., ... & Vento, T. J. (2015). Monitoring exposure to Ebola and health of US military personnel deployed in support of Ebola control efforts—Liberia, October 25, 2014–February 27, 2015. *MMWR Morb Mortal Wkly Rep*, 64, 690-4.

⁶ Although an infectious dose or ID50 of Zika virus is not known, urine of Zika patients is known to have significant viral load. For example, Fourcade et al. (2016) detected as much as 74,000 copies of viral RNA per mL of urine in a Zika-infected male and as much as 5,550 copies/mL in a Zika-infected female. See: Fourcade, C., Mansuya, J. M., Dutertre, M., Delpech, M., Marchou, B., Delobel, P., & Martin-Blondel, G. (2016). Viral load kinetics of Zika virus in plasma, urine and saliva in a couple returning from Martinique, French West Indies. *Journal of Clinical Virology*, 82: 1-4.

⁷ Centers for Disease Control and Prevention [CDC]. (2016). Interim Guidance for Zika Virus Testing of Urine — United States, 2016. *MMWR Morb Mortal Wkly Rep*, 65.

⁸ Body substance isolation focused on the isolation of all moist and potentially infectious body substances (blood, feces, urine, sputum, saliva, wound drainage, and other body fluids) from all patients, regardless of their presumed infection status, primarily through the use of gloves.

⁹ OSHA is considering the promulgation of an [infectious diseases standard](#) to supplement the infection control requirements of the BBP standard. This new standard would require, among other things, the use of SP and TBP when healthcare and healthcare support workers have occupational exposure to sources of infectious agents.

¹⁰ UP as originally defined by CDC does not necessarily apply in situations where it is difficult or impossible to differentiate between body fluids; OSHA's BBP standard expanded application of UP under the standard to include such situations.

¹¹ Under the category "Any body fluid that is visibly contaminated with blood," UP and the BBP standard would apply when there is visible contamination of these fluids with blood.

¹² OSHA recommends that employers develop and implement exposure control plans for all types of infectious agents.

¹³ OSHA recommends that employers implement this control for all types of infectious agents.

¹⁴ Paragraph (d)(3)(ix) of the BBP standard requires gloves to be worn when it can be reasonably anticipated that the employee may have hand contact with mucous membranes, non-intact skin, and certain other potential sources of exposure, in addition to blood and other potentially infectious materials covered under the standard.

¹⁵ OSHA recommends implementing post exposure evaluation and follow-up for all types of infectious agents.

Retrieved from https://www.osha.gov/SLTC/bloodborne pathogens/worker_protections.html