Environmental Infection Prevention

Wisconsin Hospital
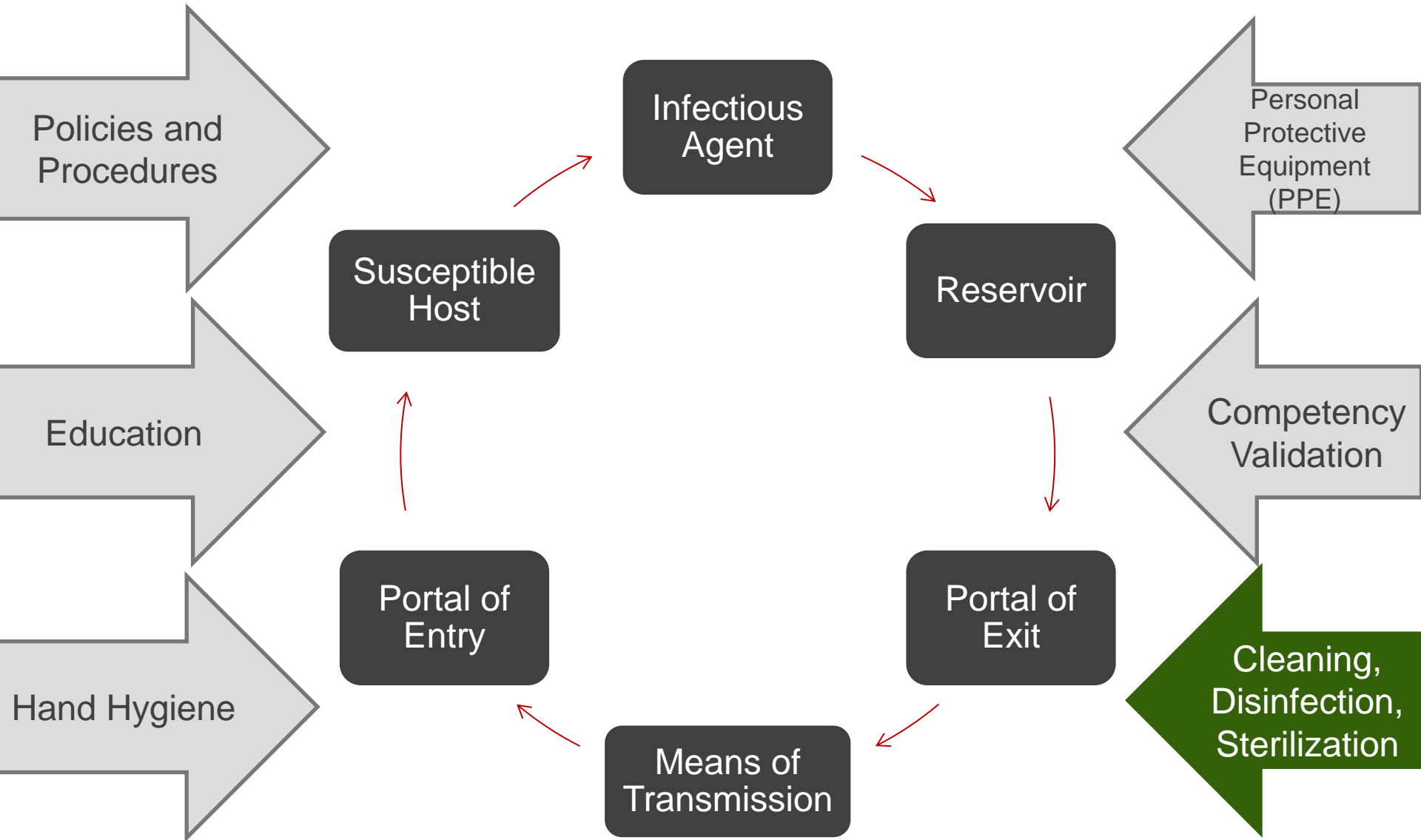Infection Preventionist Boot Camp

Beth Ellinger, MS, MPH, CIC
Infection Preventionist
October 23, 2019

Objectives

Review cleaning and disinfection principles for health care facilities regarding:

- Patient care equipment
- Environmental surfaces
- Laundry

BREAK the CHAIN

Policies and Procedures

Education

Hand Hygiene

Infectious Agent

Susceptible Host

Reservoir

Personal Protective Equipment (PPE)

Competency Validation

Portal of Entry

Portal of Exit

Means of Transmission

Cleaning, Disinfection, Sterilization

Survival of Microorganisms

C. difficile spores	≤ 5 months
E. Coli	≤ 16 months
Enterococcus species	≤ 4 months
Norovirus	≤ 7 days
S. aureus	≤ 7 months
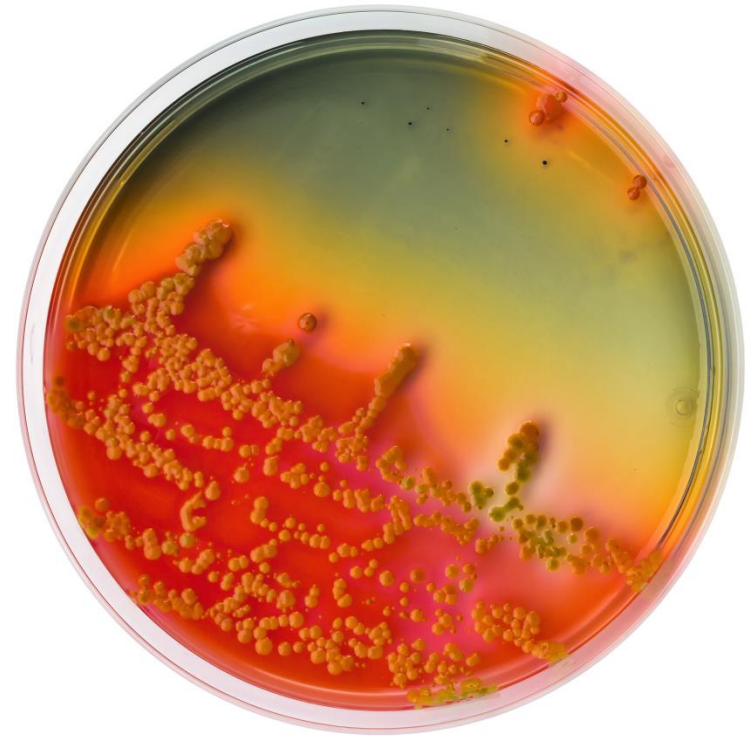
Kramer, A., Schwebke, I., and Kampf, G., (2006). How long do nosocomial pathogens persist on inanimate surfaces? A systematic review. BMC Infectious Diseases, 6, 130. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1564025/

Disposable Patient Care Equipment

Single use item:
- Discard after one use.
- Examples: needles, syringes, urinary catheters, disposable instruments.

Reusable single patient item:
- Discard after use on a single patient.
- Clean routinely and when visibly soiled.

Reusable Multi-Patient Equipment

If proper reprocessing is done after each use, this equipment can be used for more than one patient.

What is Reprocessing?

The FDA defines reprocessing as a detailed, multistep process to clean and then disinfect or sterilize a medical device.

Cleaning

- Physical removal of visible material (e.g., soil, organic material) from objects through the mechanical action of scrubbing with detergents and surfactants
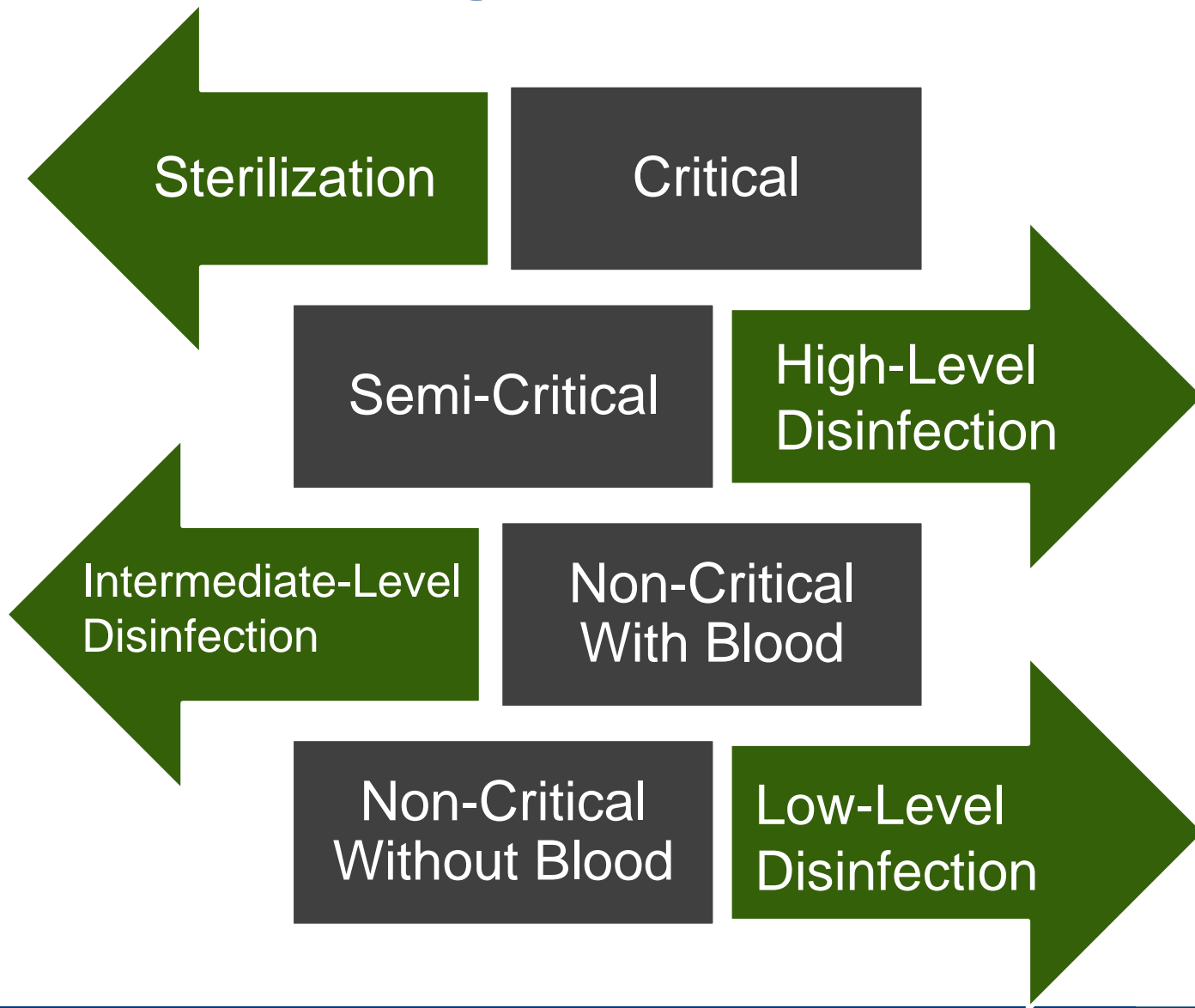- A necessary step prior to disinfection or sterilization

How Does it Need to be Cleaned?

The manufacturer's instructions for use (IFU) provide directions on reprocessing items after patient use to render them safe for reuse.

Always defer to the highest level of disinfection.
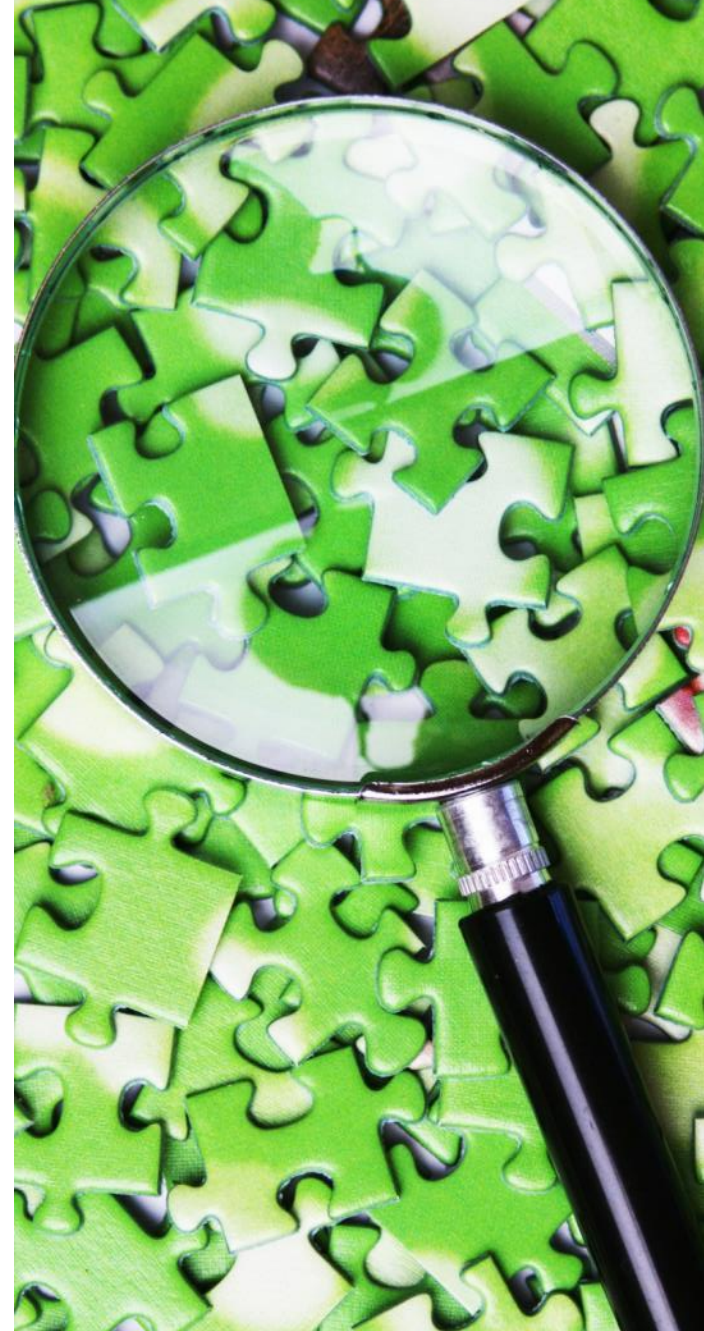
Spaulding Classification

Sterilization ← Critical

Semi-Critical → High-Level Disinfection

Intermediate-Level Disinfection ← Non-Critical With Blood

Non-Critical Without Blood → Low-Level Disinfection

Critical Equipment Requires Sterilization

- Enters sterile tissue and must be sterile
- Destroys all microorganisms, including bacterial spores
- Uses steam, gas, or chemical sterilants

Semi-Critical Equipment Requires High-Level Disinfection (HLD)

- Contacts mucous membranes
- Destroys all microorganisms except high numbers of bacterial spores
- Uses chemical HLD or sterilants

Reprocessing is Complex

Missed steps can lead to infections and outbreaks (e.g., ERCP scope elevator channel).

Non-Critical Items Require Intermediate or Low-Level Disinfection

Contact **intact skin** (examples: blood pressure cuffs, stethoscopes, rehab equipment)

Non-Critical Items Require Low-Level Disinfection

- Contacts intact skin

- Destroys vegetative bacteria, and some fungi and viruses, but not mycobacteria or spores

- Uses an EPA-registered hospital disinfectant with HBV and HIV activity, but no tuberculocidal claim

- If visible blood is present uses an EPA-registered hospital disinfectant with *tuberculocidal* activity

Remember:

If it isn't clean, it can't be disinfected or sterilized.

Environmental Surface Cleaning

✓ Patient Rooms: Daily and Terminally

✓ Invasive Procedure and Treatment Rooms

✓ Non-Invasive Procedure and Treatment Rooms

✓ Common Areas

✓ Carpeting, Furnishings, etc.

Environmental Cleaning

- Frequently touched (i.e., high-touch surfaces)
- Minimally touched

EPA-Registered Hospital Disinfectants

https://www.epa.gov/pesticide-registration/selected-epa-registered-disinfectants

EPA-Registered Hospital Disinfectants

- List B: EPA Registered Tuberculocide Products Effective Against *Mycobacterium tuberculosis*

- List C: EPA's Registered Antimicrobial Products Effective Against Human HIV-1 Virus

- List D: EPA's Registered Antimicrobial Products Effective Against Human HIV-1 and Hepatitis B Virus

- List E: EPA's Registered Antimicrobial Products Effective Against *Mycobacterium tuberculosis*Human HIV-1 and Hepatitis B Virus

- List F: EPA's Registered Antimicrobial Products Effective Against Hepatitis C Virus

- List G: EPA's Registered Antimicrobial Products Effective Against *Norovirus*

- List H: EPA's Registered Antimicrobial Products Effective Against Methicillin Resistant*Staphylococcus aureus (MRSA)* and Vancomycin Resistant *Enterococcus faecalis* or *faecium* (VRE)

- List J: EPA's Registered Antimicrobial Products for Medical Waste Treatment

- List K: EPA's Registered Antimicrobial Products Effective Against Clostridium difficile Spores(PDF)

Guidelines for Environmental Infection Control in Health-Care Facilities (2003)

https://www.cdc.gov/infectioncontrol/pdf/guidelines/environmental-guidelines-P.pdf

Guidelines for Environmental Infection Control in Health-Care Facilities

Recommendations of CDC and the Healthcare Infection Control Practices Advisory Committee (HICPAC)

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention (CDC)

Guidelines for Environmental Infection Control in Health-Care Facilities (2003)

E. Environmental Services, E.I. Cleaning and Disinfecting Strategies for Environmental Surfaces in Patient Care Areas

#	Recommendation	Category
E.I.A.	Select EPA-registered disinfectants, if available, and use them in accordance with the manufacturer's instructions. (EPA: 7 United States Code [USC] § 136 et seq)	IB, IC
E.I.B.	Do not use high-level disinfectants/liquid chemical sterilants for disinfection of either noncritical instrument/devices or any environmental surfaces; such use is counter to label instructions for these toxic chemicals. (FDA: 21 CFR 801.5, 807.87.e)	IB, IC
E.I.C.	Follow manufacturers' instructions for cleaning and maintaining noncritical medical equipment.	II
E.I.D.	In the absence of a manufacturer's cleaning instructions, follow certain procedures.	
E.I.D.1.	Clean noncritical medical equipment surfaces with a detergent/disinfectant. This may be followed with an application of an EPA-registered hospital disinfectant with or without a tuberculocidal claim (depending on the nature of the surface and the degree of contamination), in accordance with disinfectant label instructions.	II
E.I.D.2.	Do not use alcohol to disinfect large environmental surfaces.	II

Guidelines for Environmental Infection Control in Health Care Facilities (2003)

E.II. Cleaning Spills of Blood and Body Substances

#	Recommendation	Category
E.II.A.	Promptly clean and decontaminate spills of blood or other potentially infectious materials. (OSHA: 29 CFR 1910.1030 §d.4.ii.A)	IB, IC
E.II.B.	Follow proper procedures for site decontamination of spills of blood or blood-containing body fluids. (OSHA: 29 CFR 1910.1030 § d.4.ii.A)	IC
E.II.B.1.	Use protective gloves and other PPE appropriate for this task. (OSHA: 29 CFR 1910.1030 § d.3.i, ii)	IC
E.II.B.2.	If the spill contains large amounts of blood or body fluids, clean the visible matter with disposable absorbent material, and discard the contaminated materials in appropriate, labeled containment. (OSHA: 29 CFR 1910.1030 § d.4.iii.B)	IC
E.II.B.3.	Swab the area with a cloth or paper towels moderately wetted with disinfectant, and allow the surface to dry. (OSHA: 29 CFR 1910.1030 § d.4.ii.A)	IC

Selecting a Disinfectant

- Microbiocidal activity: Organisms affected by the product are listed on the label.

- Contact time: Longer contact (wet) times may require repeat application, but are necessary to kill microorganisms.

Selecting a Disinfectant

- Ease of use

  - Ready-to-use product or requires dilution?

  - Are the directions easy to understand?

- Safety

  - What PPE is required?

 - Is special ventilation needed?

- Cost

Using a One-Step Cleaner and Disinfectant

- Read the IFU carefully.
- Follow the instructions exactly or disinfection will not occur.

Standardized Cleaning Process

Develop and implement policies and procedures:

- Daily cleaning checklist
- Terminal cleaning checklist
- Cleaning order
- Product decisions and use
- PPE needed
- Product contact or wet time
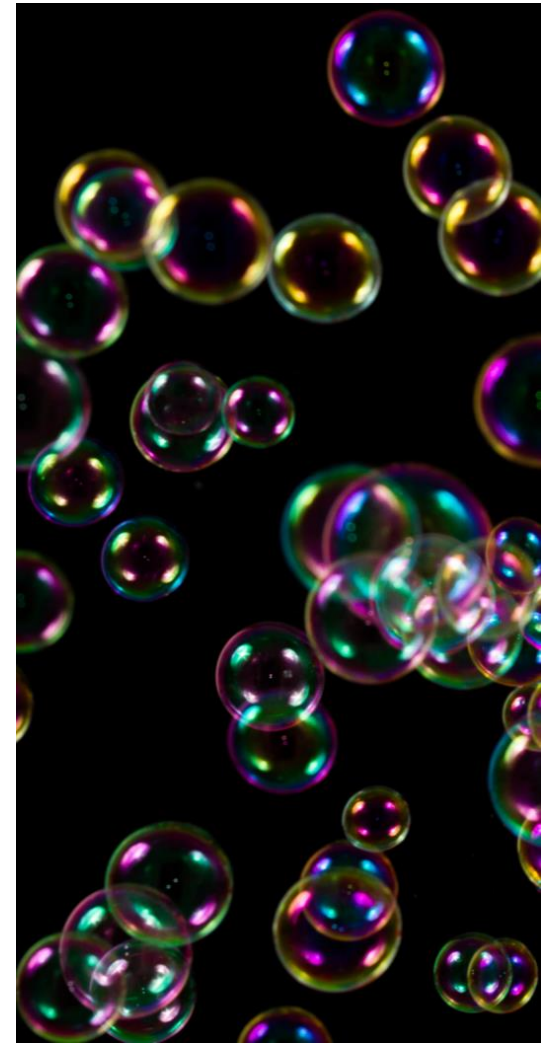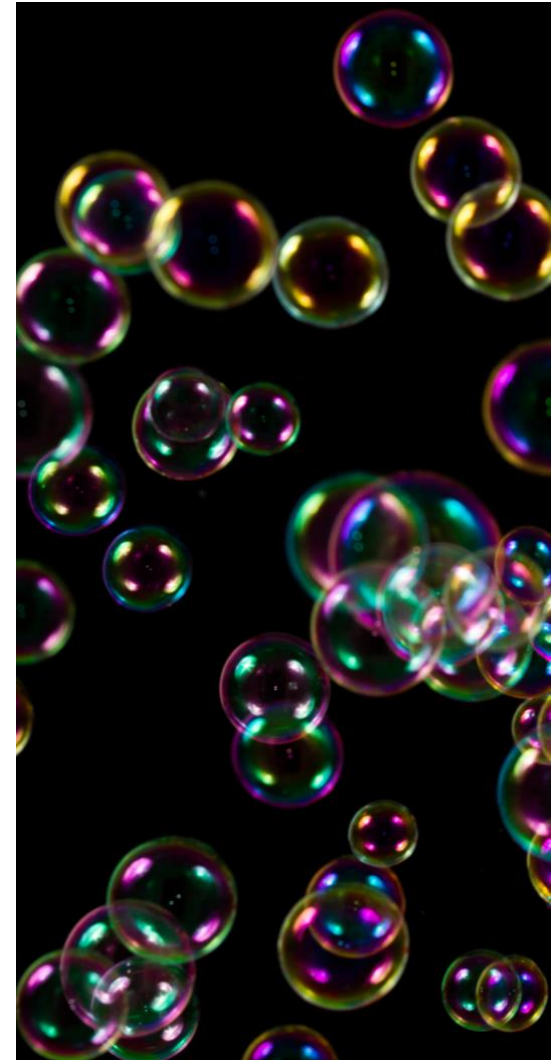
Standardized Cleaning Process

Cleaning should be done:

- Starting top to bottom.

- Starting cleanest to dirtiest.

- Preventing recontamination.

- Focusing on high-touch surfaces (e.g., call light, bed rails, toilet handle, toilet seat, handrails, sink handles).
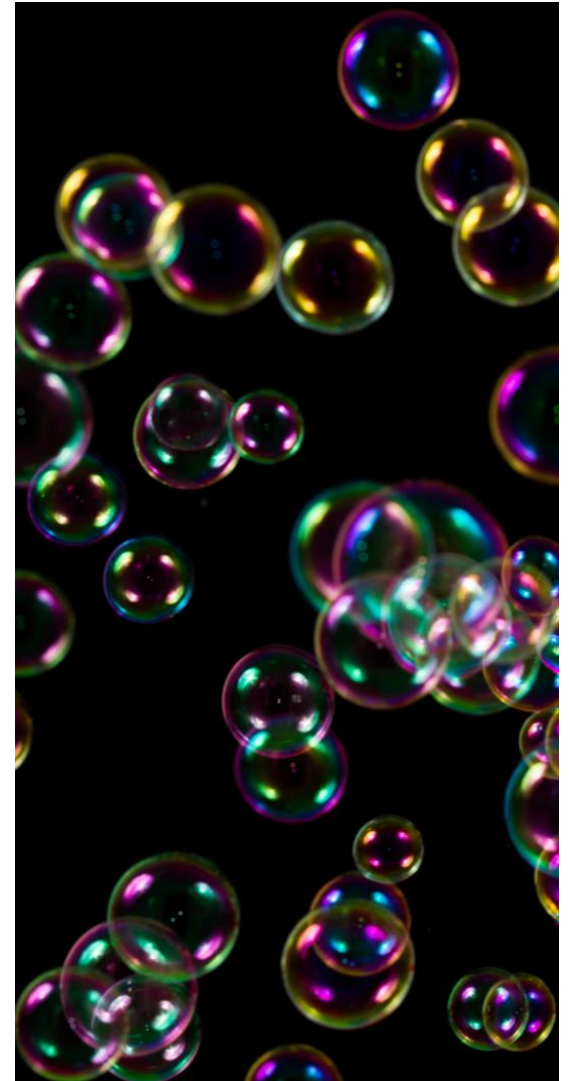
Standardized Cleaning Process

- Provide education and competency training for all staff who do environmental cleaning:
  - Upon hire.
  - Annually.
  - During outbreaks or other concerns.
- Conduct cleaning process audits periodically (e.g., semi-annually, quarterly).

Failure to Follow a Standardized Process Can Spread Pathogens

Common deviations include:

- Improper cleaning prior to disinfection
- Insufficient contact or wet time
- Incorrect or lack of proper PPE
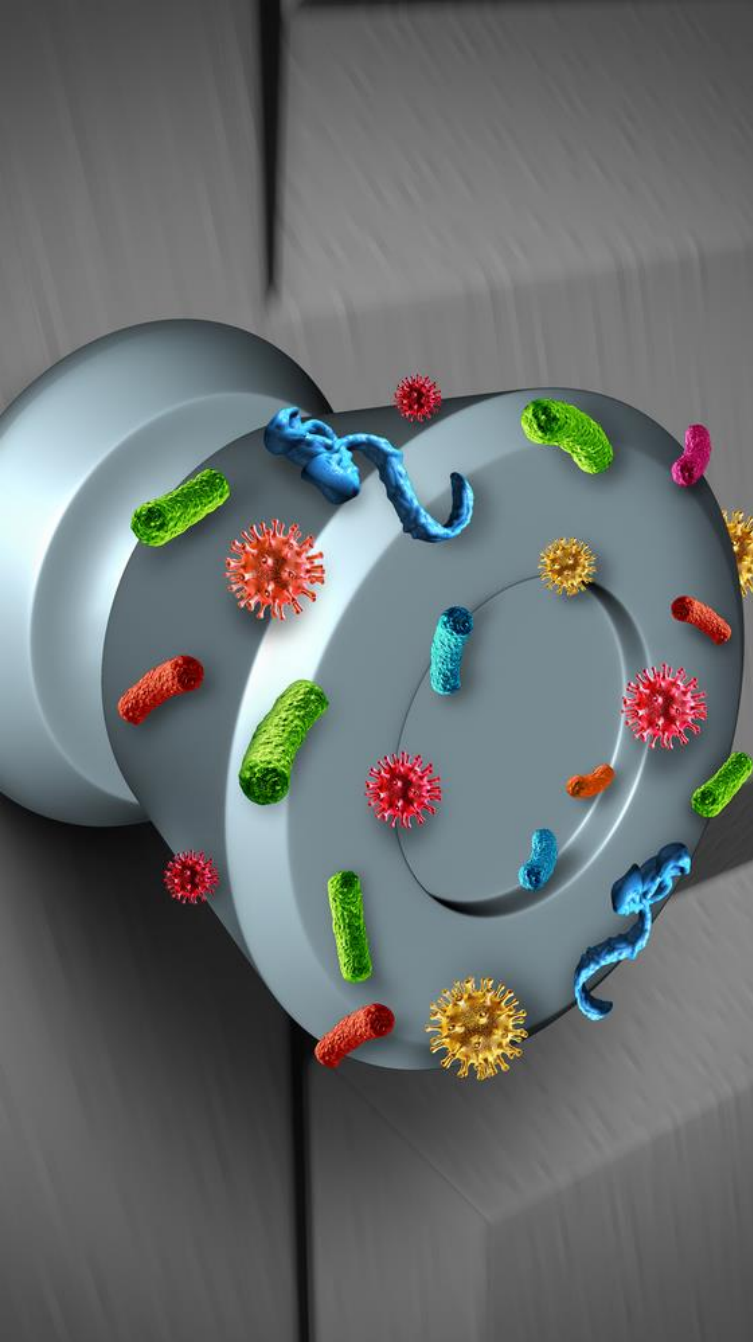
Special Cleaning Considerations

C. difficile

Norovirus

EPA United States Environmental Protection Agency

Environmental Topics   Laws & Regulations   About EPA   Search EPA.gov

CONTACT US   SHARE

Pesticide Registration

- Pesticide Registration Home
- About Pesticide Registration
- Electronic Submission of Applications
- Pesticide Registration Manual
- Fees and Waivers
- Registration Information by

LIST K: EPA's Registered Antimicrobial Products Effective against Clostridium difficile Spores

Notes about this list:

Environmental Topics   Laws & Regulations   About EPA   Search EPA.gov

CONTACT US   SHARE

Pesticide Registration

- Pesticide Registration Home
- About Pesticide Registration
- Electronic Submission of Applications
- Pesticide Registration Manual
- Fees and Waivers
- Registration Information by Type of Pesticide

List G: EPA's Registered Antimicrobial Products Effective Against Norovirus

Notes about this list:

- All EPA-registered pesticides must have an EPA registration number, which consists of a company number and a product number (e.g., 123-45). Alternative brand names have the same EPA

UV Light Disinfection

Study from Duke University found that adding UV light disinfection to standard room cleaning modestly decreases hospital incidence of *C. diff* and VRE.

https://www.dukehealth.org/blog/uv-light-helps-duke-hospitals-fight-transmission-of-superbugs

UV Light Disinfection Considerations

- Must still clean rooms with traditional products prior to UV disinfection
- Adds time to the room turnover process
- Used only for terminal cleaning (i.e., patients and staff cannot be in the room)
- Only as good as your manual process
- Do your homework prior to bringing it into your organization

CDC/STRIVE Infection Control Training

States Targeting Reduction in Infections via Engagement (STRIVE)

Environmental Cleaning - WB4224

All modules must be taken to receive CE.

Get CE for Environmental Cleaning Course WB4224

- **EC 101: Environmental Cleaning and Disinfection: Principles of Infection Transmission and the Role of the Environment** [PDF – 53 pages]
  Describes the important role that the hospital environment can play in pathogen transmission and shares useful concepts to improve a hospital cleaning and disinfection program.

- **EC 102: Cleaning and Disinfection Strategies for Non-Critical Surfaces and Equipment** [PDF – 52 pages]
  Provides an overview of strategies to consider when training staff about cleaning and disinfection policies and procedures, and identifies tools to assist with monitoring and auditing these practices.

- **EC 103: Using a Quality Improvement Approach to Improve Environmental Cleaning Practices** [PDF – 60 pages]
  Explores using quality improvement strategies, like Plan-Do-Study-Act (PDSA), to monitor and guide infection prevention improvement initiatives.

CDC Tools for Healthcare Settings

Evaluating Environmental Cleaning

- Options for Evaluating Environmental Cleaning (toolkit) [PDF – 344 KB]

- Environmental Checklist for Monitoring Terminal Cleaning

  - CDC Environmental Checklist for Monitoring Terminal Cleaning [DOC – 52 KB]

  - CDC Environmental Checklist for Monitoring Terminal Cleaning [PDF – 71 KB]

- Terminal Cleaning Spreadsheet [XLS – 344 KB]

https://www.cdc.gov/infectioncontrol/pdf/icar/hospital.pdf

Laundry in Healthcare Settings

Guidelines for Environmental Infection Control in Health-Care Facilities (2003)

https://www.cdc.gov/infectioncontrol/pdf/guidelines/environmental-guidelines-P.pdf

Guidelines for Environmental Infection Control in Health-Care Facilities

Recommendations of CDC and the Healthcare Infection Control Practices Advisory Committee (HICPAC)

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention (CDC)

Guidelines for Environmental Infection Control in Health-Care Facilities (2003)

G. Laundry and Bedding

G.II. Laundry Facilities and Equipment

#	Recommendation	Category
G.II.A.	Maintain the receiving area for contaminated textiles at negative pressure compared with the clean areas of the laundry in accordance with AIA construction standards in effect during the time of facility construction. (AIA: 7.23.B1, B2)	IC
G.II.B.	Ensure that laundry areas have handwashing facilities and products and appropriate PPE available for workers. (AIA: 7.23.D4; OSHA: 29 CFR 1910.1030 § d.2.iii)	IC
G.II.C.	Use and maintain laundry equipment according to manufacturers' instructions.	II
G.II.D.	Do not leave damp textiles or fabrics in machines overnight.	II
G.II.E.	Disinfection of washing and drying machines in residential care is not needed as long as gross soil is removed before washing and proper washing and drying procedures are used.	II

G.III. Routine Handling of Contaminated Laundry

#	Recommendation	Category
G.III.A.	Handle contaminated textiles and fabrics with minimum agitation to avoid contamination of air, surfaces, and persons. (OSHA: 29 CFR 1910.1030 § d.4.iv)	IC
G.III.B.	Bag or otherwise contain contaminated textiles and fabrics at the point of use. (OSHA: 29 CFR 1910.1030 § d.4.iv)	IC
G.III.B.1.	Do not sort or prerinse contaminated textiles or fabrics in patient-care areas. (OSHA: 29 CFR 1910.1030 §d.4.iv)	IC

# Guidelines for Environmental Infection Control in Health-Care Facilities (2003)

G.IV. Laundry Process

#	Recommendation	Category
G.IV.A.	If hot-water laundry cycles are used, wash with detergent in water ≥160°F (≥71°C) for ≥25 minutes. (AIA: 7.31.E3)	IC
G.IV.B.	No recommendation is offered regarding a hot-water temperature setting and cycle duration for items laundered in residence-style health-care facilities.	Unresolved issue
G.IV.C.	Follow fabric-care instructions and special laundering requirements for items used in the facility.	II
G.IV.D.	Choose chemicals suitable for low-temperature washing at proper use concentration if low-temperature (<160°F [<71°C]) laundry cycles are used.	II
G.IV.E.	Package, transport, and store clean textiles and fabrics by methods that will ensure their cleanliness and protect them from dust and soil during interfacility loading, transport, and unloading.	II

CMS Infection Control: Laundry Handling

Laundry is processed in a manner consistent with hospital infection control policies and procedures to maximize prevention of infection and communicable disease.
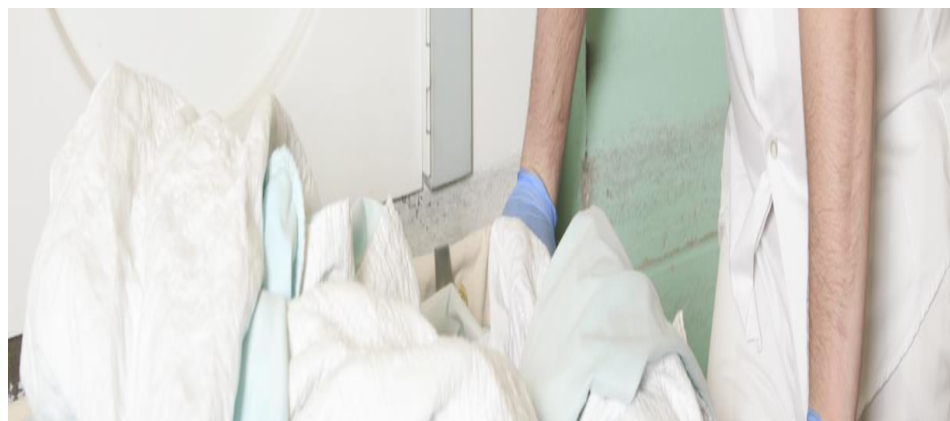
CMS Infection Control: Laundry Containment

- Bag and contain contaminated linen where collected.

- Sort and rinse only in the contaminated laundry area.

- Double-bag linen only if the bag exterior is visibly contaminated or wet.

CMS Infection Control: Laundry Transport

- Transport contaminated and clean linen in separate carts.

- Clean and disinfect contaminated carts before using for clean linen if separate carts are unavailable.

- Transport clean linen using methods that ensure cleanliness.

Laundry Accreditation

Healthcare Laundries Accredited for Patient Safety
Inspecting, Accrediting for 10+ Years

Home   At A Glance   Why Accredit   Why HLAC   Standards   Accredited Laundries   Start Here

The Healthcare Laundry Accreditation Council (HLAC) is a nonprofit organization that inspects and accredits laundries that process reusable textiles for hospitals, nursing homes and other healthcare facilities.

Points to Consider

- How will hospital construction affect reprocessing, environmental cleaning, and laundry?
- Privacy curtains…do we really need them?
- How easily cleanable/wipeable is your furniture?

Case Study

At 2 p.m., you learn about a new case of *C. difficile* on the med-surg unit. This is the second case on the unit today. There are no issues with antibiotics. You suspect both are HAI. There hasn't been an HAI case on this unit in over a year.

Outbreak Investigation

1. Confirm the presence of an outbreak.
2. Alert key partners about the investigation.
3. Implement initial control measures.
4. Perform a literature review.
5. Establish a preliminary case definition.
6. Develop methodology for case finding.
7. Prepare an initial line list and epidemic curve.
8. Observe and review potentially implicated patient care activities.
9. Consider whether environmental sampling should be performed.

Case Study

At 2 p.m., you learn about a new case of *C. difficile* on the med-surg unit. This is the second case on the unit today. There are no issues with antibiotics. You suspect both are HAI. There hasn't been an HAI case on this unit in over a year.

- What are your initial steps?
- Whom would you notify and what do you tell them?
- What observations could you make to validate policies, procedures, or protocols are being followed?
- What data should be reviewed?
- What reports could be run from NHSN to assist in this review (e.g., TAP, SIR, SUR, incidence rate)?

Questions?

Beth Ellinger, MS, MPH, CIC
Infection Preventionist
Wisconsin Department of Health Services
Division of Public Health
608-266-0365
beth.ellinger@dhs.wisconsin.gov

Resources

- CDC Disinfection and Sterilization
  https://www.cdc.gov/infectioncontrol/guidelines/disinfection/index.html
- CDC Environmental Cleaning Toolkit
  https://www.cdc.gov/hai/pdfs/toolkits/environ-cleaning-eval-toolkit12-2-2010.pdf
- CDC *Guidelines for Environmental Infection Control in Health Care Facilities (2003)*
  https://www.cdc.gov/infectioncontrol/guidelines/environmental/index.html
- CDC ICAR for Acute Care Hospitals
  https://www.cdc.gov/infectioncontrol/pdf/icar/hospital.pdf
- CDC ICAR for Outpatient Settings
  https://www.cdc.gov/infectioncontrol/pdf/icar/outpatient.pdf
- CDC *Guide to Infection Prevention for Outpatient Podiatry Settings*
  https://www.cdc.gov/infectioncontrol/pdf/Podiatry-Guide_508.pdf
- CMS Hospital Infection Control Worksheet
  https://www.cms.gov/Medicare/Provider-Enrollment-and-Certification/SurveyCertificationGenInfo/Downloads/Survey-and-Cert-Letter-15-12-Attachment-1.pdf