Cleaning and Low-Level Disinfection in Healthcare

Shelly Andre, MSN, RN, CIC

Infection Preventionist

CHI Health St. Elizabeth

Nebraska Infection Control Network

Key Points

- Selection of Disinfectants
- Policy Development
- Development of a Training Program
- Quality Assurance
- Linen Handling

Disclaimer

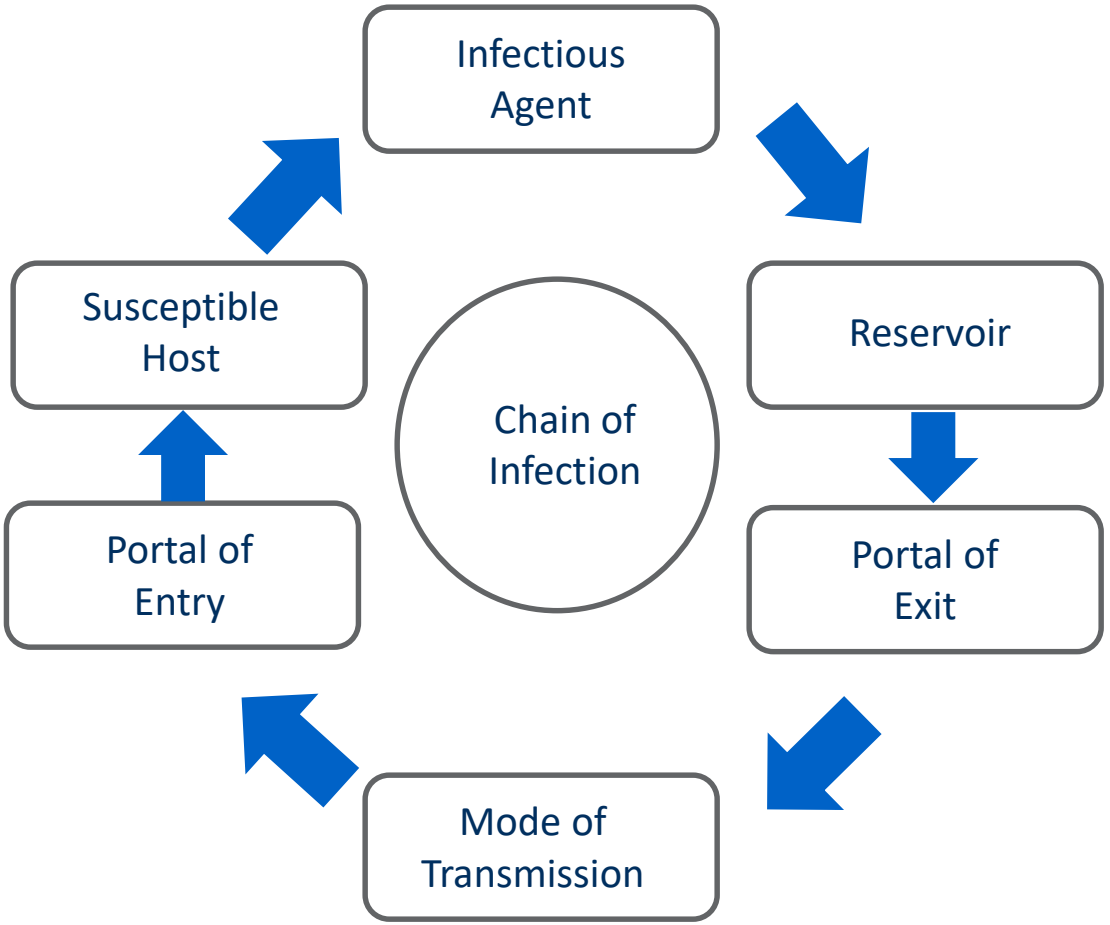
- Every attempt has been made to provide an unbiased, balanced presentation.
- This topic however, lends itself to specific products to be discussed.
- Name brands have changed to reflect generic names when possible.

Environmental Cleaning

- Regulations require facilities to provide a clean and sanitary environment
  - OSHA, CMS, TJC
- Environmental contamination plays a part in the transmission of HAI's
- Environmental cleaning is an important intervention to break the transmission of pathogens
  - Cleaning – remove or reduce bioburden using water, detergents, and mechanical actions
  - Disinfection – inactivating microorganisms on inanimate objects using chemicals

Stopping the Chain of Transmission

At any point of this chain, the transmission of infection can be stopped.



Why Does This Matter?

- Patients have increased potential for exposure to pathogens
  - Shared patient equipment
  - Invasive devices
  - Surgery and Invasive procedures
- Patients are vulnerable
  - Chronic illnesses
  - Weakened immune systems
- Hospital or Healthcare-associated infections
- Outbreaks

Clean, Sanitize, or Disinfect?

Action	What does it do?	Does EPA regulate the product?
Cleaning	Cleaning removes dirt and organic matter from surfaces using soap or detergents.	EPA regulates cleaning products only if they sanitize or disinfect.
Sanitizing	Sanitizing kills bacteria on surfaces using chemicals. It is not intended to kill viruses.	Yes, EPA registers products that sanitize.
Disinfecting	Disinfecting kills viruses and bacteria on surfaces using chemicals.	Yes, EPA registers products that disinfect.
Hand Sanitizer	Using hand sanitizer kills pathogens on skin.	No, hand sanitizers are regulated by the FDA.

EPA What's the difference between products that disinfect, sanitize, and clean surfaces?
https://www.epa.gov/coronavirus/whats-difference-between-products-disinfect-sanitize-and-clean-surfaces

What is the Difference Between General Use and Hospital grade products

General or Broad-spectrum – A disinfectant that is effective against both gram-positive and gram-negative bacteria (Staphylococcus aureus and Salmonella enterica) is considered to be a general or broad spectrum disinfectant. General or broad spectrum disinfectants have a wide variety of uses in residential, commercial, institutional, and other sites.

Hospital - A disinfectant that is a general or broad-spectrum disinfectant and also is effective against the nosocomial bacterial pathogen Pseudomonas aeruginosa is a Hospital disinfectant. These disinfectants are generally for use in hospitals, clinics, dental offices, or other health care related facilities.

https://www.epa.gov/pesticide-registration/pesticide-registration-manual-chapter-4-additional-considerations#use

Cleaning

- Cleaning is the necessary first step of any disinfection process.
- Cleaning removes organic matter, salts, and visible soils, all of which interfere with the inactivation of microorganisms.
- The physical action of scrubbing with detergents and surfactants and rinsing with water removes substantial numbers of microorganisms.
- In some environments, surfaces that cannot be easily cleaned adequately, should be protected with barriers.
- Sometimes cleaning is enough but sometimes disinfection is necessary.
  - Removal of all visible blood and inorganic and organic matter can be as critical as the germicidal activity of the disinfecting agent.

CDC - Project Firstline - Episode 16: Cleaning? Disinfection? What is the Difference? https://www.youtube.com/watch?v=dIuRI9OpjnY

CDC – Dental Infection Prevention and Control - Best Practices for Environmental Infection Prevention and Control https://www.cdc.gov/dental-infection-control/hcp/dental-ipc-faqs/cleaning-disinfecting-environmental-surface.html

Disinfection – Different Step*

** Note: Disinfectant products should not be used as cleaners unless the label indicates the product is suitable for such use.*

- **Disinfection is a different step that kills germs, usually a separate step but not always**.
  - Disinfection shouldn't come before cleaning, they either happen at the same time in a single product or cleaning comes first in a two-step process of cleaning and disinfection.
- **When you do disinfect, it is important that the surface is clean.**
  - If isn't clean, disinfection might not work as the product might not be able to get to the germs because they are covered in other things.
  - If there's dirt or spills or smears on the surface, you might spread that around while you are disinfecting because the disinfectant won't necessarily pick that up and clean.

Cleaning & Disinfection Methods

Ready to Use Wipes, Squeeze Pour Bottles, & Sprays

- Ready to use wipes are disposable wipes saturated with an appropriate disinfectant or detergent-disinfectant product.
  - Ensure they are stored appropriately with the lid closed, so the wipes remain wet. Discard wipes if they are no longer saturated.

- Narrow-necked squeeze pour bottles store the appropriate disinfectant or detergent-disinfectant product that is then poured over the cleaning cloths.
  - Narrow-necked bottles are preferred over buckets to prevent the “double dipping” of cleaning cloths, which can contaminate solutions.

- Spray bottles are where the appropriate disinfectant or detergent-disinfectant product is sprayed onto the cleaning cloths or directly onto surfaces then wiped.
  - Squeeze bottles are preferred over spray bottles for applying cleaning or disinfectant solutions directly to cleaning cloths before application to a surface.

- All portable containers for environmental cleaning products (or solutions) should be clean, dry, appropriately-sized, labeled, and dated.

CDC - Best Practices for Environmental Cleaning in Healthcare Facilities: in Resource-Limited Settings
https://www.cdc.gov/healthcare-associated-infections/media/pdfs/environmental-cleaning-rls-508.pdf

Cleaning & Disinfection Method

Bucket Immersion a.k.a. Open Bucket Method

Bucket Immersion a.k.a. Open Bucket Method

1. Bucket is pre-filled with disinfectant solution (mixed to manufacturer's instructions for use), usually at a filling station.
2. Clean cleaning cloths are placed in the bucket.
3. The object or surface is cleaned with sufficient saturation that the disinfectant stays on the surface, wet for the prescribed contact time.

Key Strategies for Success

- ✓ Ensure the type of cloths are compatible with the disinfectant
- ✓ Wipes are only removed from the bucket, never double dipped
- ✓ Dirty rag bag is needed on the housekeeping cart
- ✓ Change rags as needed to ensure saturation

NE ICAP – Environmental Cleaning in Healthcare Part 1: Set up the Cleaning Cart
https://www.youtube.com/watch?v=_O4B0Nmfr40&list=PLUK2nSFZhL9k-a1mc__ksZeTvDUa5he9Q&index=3

Common Environmental Contaminates

- Many organisms can live for days to months on surfaces
  - Clostridium difficile – 5 months
  - Candida auris - >3 weeks
- Many more examples available

Selecting products

What are you Cleaning?

- Non-Critical Items
  - Items that contact intact skin
  - Items DO NOT contact mucous membranes

Equipment

Stethoscopes
Wheel Chairs
Blood pressure cuffs, tubing, machines
Bed rails
Linens
Keyboards

Environmental Surfaces

Patient Zone
Specialty Areas
Rapid turnover areas (ED's)
Clinical non-patient areas
Public spaces

Considerations for the Selection of Disinfectants

- Speed of disinfection and speed of drying with normal use
  - Need adequate dwell time/ contact time
- Cleaning ability
- Disinfection ability and spectrum
- Personnel health and safety
- Surface compatibility / **instructions for use** for the surface
- Ease of use and application method (wipes, pour bottles, bucket immersion, and sprays)
- Stability
- Cost

Rutala, W., and Weber, D. Disinfectants used for environmental disinfection and new room decontamination technology. AJIC Vol 41, Issue 5, Supplement, S36-S41, May 01, 2013 https://doi.org/10.1016/j.ajic.2012.11.006

Instructions for Use

- Never put the cleaning product in another container.
- On the label you will find:
  - Active Ingredient
  - Directions for use
    - What it can be used for
      - One step cleaner and disinfectant
      - Two step cleaner and a separate disinfectant needed
  - Wet / Dwell / Contact Time
  - Storage and Disposal
  - EPA number
  - Poison Control Number in case of emergency

Disinfectant Contact Time

- All containers will have on the label the amount of time the item will need to remain wet to fulfill the kill claim
- Does your staff know what those times are?
- When choosing a product, is that time realistic for what you will be using it for?
  - Example: LabID Label maker –

    Bleach 4 minutes vs. Hydrogen peroxide 1 minute

Contact Time = Wet Time = Dwell Time = Kill Time

Dispensing Stations vs. Ready to Use

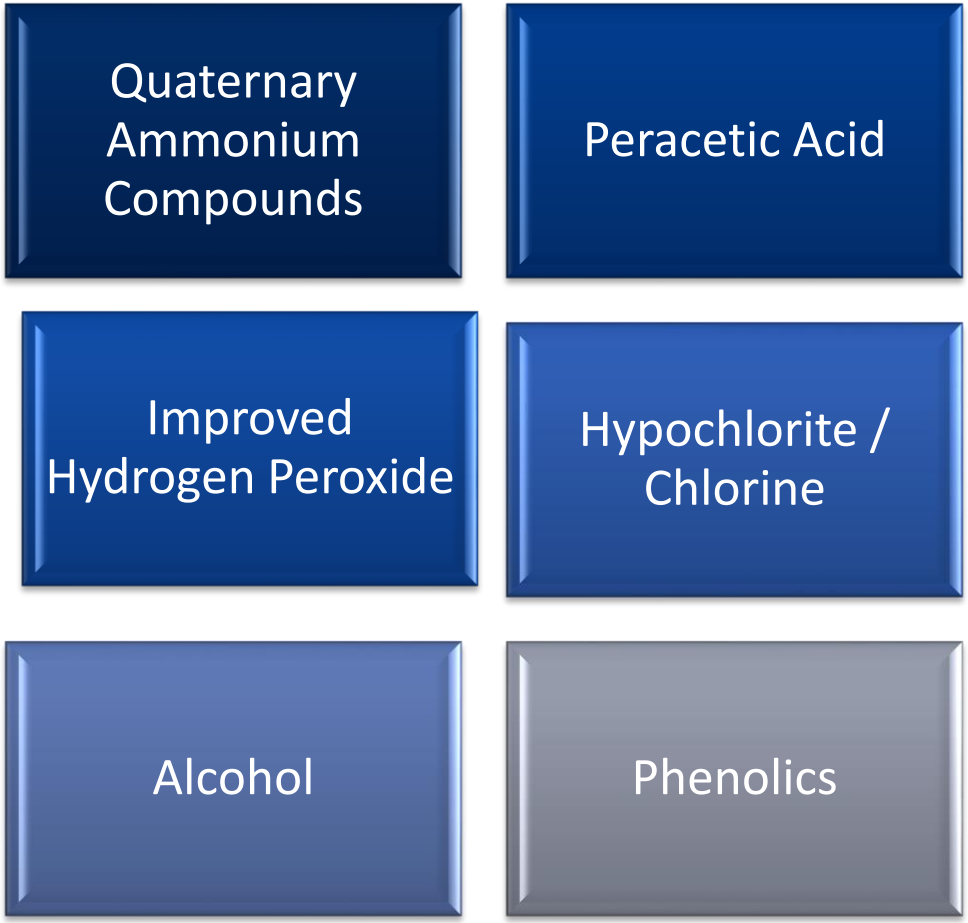
Dispensing Stations

- Dilution can vary over time, so validation process important to measure effectiveness
- Cost effective, mixing as needed at point of use
- Chemical distributed in concentrate form, higher yield.
    - Potential splash risk, must use PPE (gloves, goggles)

Ready to Use

- Comes pre-mixed, dilution is always to manufacturer's instructions for use
- Costly on per-use scale
- Requires significant amount of storage

Selection of Disinfectants



Disinfectant Comparison

Disinfectant	Advantages	Disadvantages
Chlorine (a.k.a. bleach solutions)	EPA registered, broad-spectrum, low incidence of toxicity, reduces biofilms of surfaces, sporicidal at specific concentrations, fast acting, inexpensive	Discoloration of fabrics, inactivated by organic matter, toxic when mixed with ammonia, can be corrosive to metals in high concentrations, use with care
Quaternary ammonium compounds (a.k.a 'quats')	Low cost, EPA registered, surface compatible, active against many bacteria, enveloped viruses, and fungi	Not sporicidal, not effective against non-enveloped viruses, water hardness & cotton can make it less microbiocidal
Improved hydrogen peroxide	EPA registered, non staining, surface compatible, excellent coverage of organisms, benign for environment, often sporicidal	Expensive
Phenolics	EPA registered, active against many bacteria, enveloped viruses, and fungi, inexpensive	Not sporicidal, tissue irritant, can't be used around infants
Alcohol	Good organism coverage, easy to use, used to disinfect small surfaces such as rubber stoppers on medication vials, non-toxic residue	Not EPA registered, not sporicidal, no detergent or cleaning properties, can damage instruments, flammable, evaporates quickly

New Products

- Hydrogen Peroxide
- Ultraviolet (UV) Light
  - Portable
  - Built-in
- Disinfectant Electrostatic Spray
- Self Disinfecting Surfaces

Program Development

Policy and Program Development

- Operating Procedures
- Employee Development/Ongoing Training
- Quality Assurance/ Audit & Feedback

CDC - Best Practices for Environmental Cleaning in Healthcare Facilities: in Resource-Limited Settings
https://www.cdc.gov/healthcare-associated-infections/media/pdfs/environmental-cleaning-rls-508.pdf

CDC - Appendix B1 – Cleaning procedure summaries for general patient areas
https://www.cdc.gov/healthcare-associated-infections/hcp/cleaning-global/appendix-b1.html

Minnesota Hospital Association, Environmental Services Cleaning Guidebook
https://www.mnhospitals.org/Portals/0/Documents/ptsafety/CDICleaning/4.%20Environmental%20Services%20Cleaning%20Guidebook.pdf

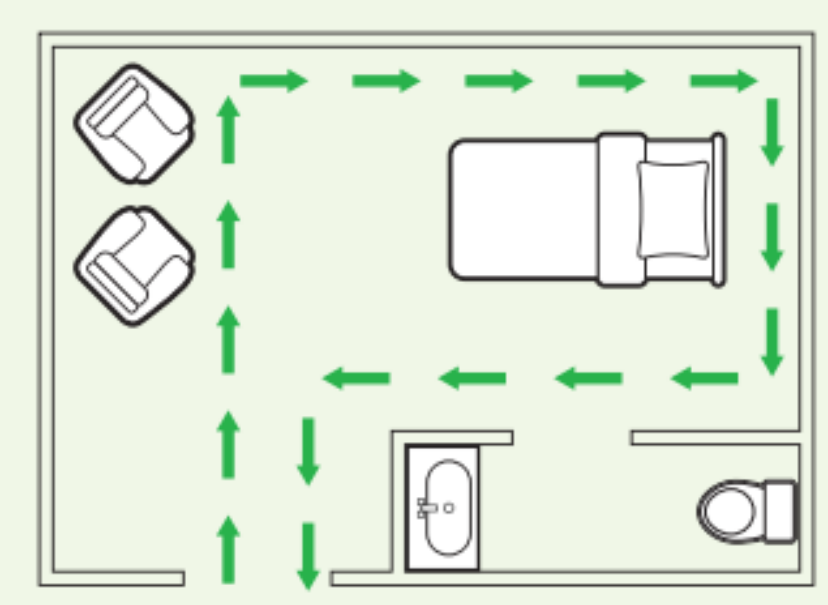
Policy Development Procedural Examples

- Disinfectant must be changed after (x) rooms
- After an isolation room, equipment must be wiped down
- Curtain change policy – after isolation/terminal cleaning, when visibly soiled & on an agreed upon frequency

Essential Purposes of Policy

- Describe protocols
- Delineate training, education, and competency
- Align with regulatory requirements
- Define performance standards
  - Compliance
  - Quality assurance/ Performance Improvement

Process of Cleaning:
Clean to Dirty
High to Low
One Direction (clockwise or counter-clockwise)
Methodical (Standard Work)



Checklists and Job Aids

Considerations

- What items will the cleaner encounter?
- What are the key items to focus on?
  - These items are high risk items and drive performance evaluation
- Is not a stagnant list
  - Routine IP and HCW review
  - Delivery of care evolves and so do cleaning surfaces (e.g., Bar Code Med Admin)

Example

2) High touch areas

High touch areas

High touch surfaces are those that have frequent contact with hands. High touch surfaces in care areas require more frequent cleaning and disinfection than minimal contact surfaces. Cleaning and disinfection is usually done at least daily and more frequently if the risk of environmental contamination is higher (e.g., intensive care units).

Patient room high touch areas

Bed hand rails

Nurse call box

Telephone

Telephone

Bedside table

Patient chair

Room door handles - interior and exterior

Light switches

Computer keyboards

In-room sinks

3

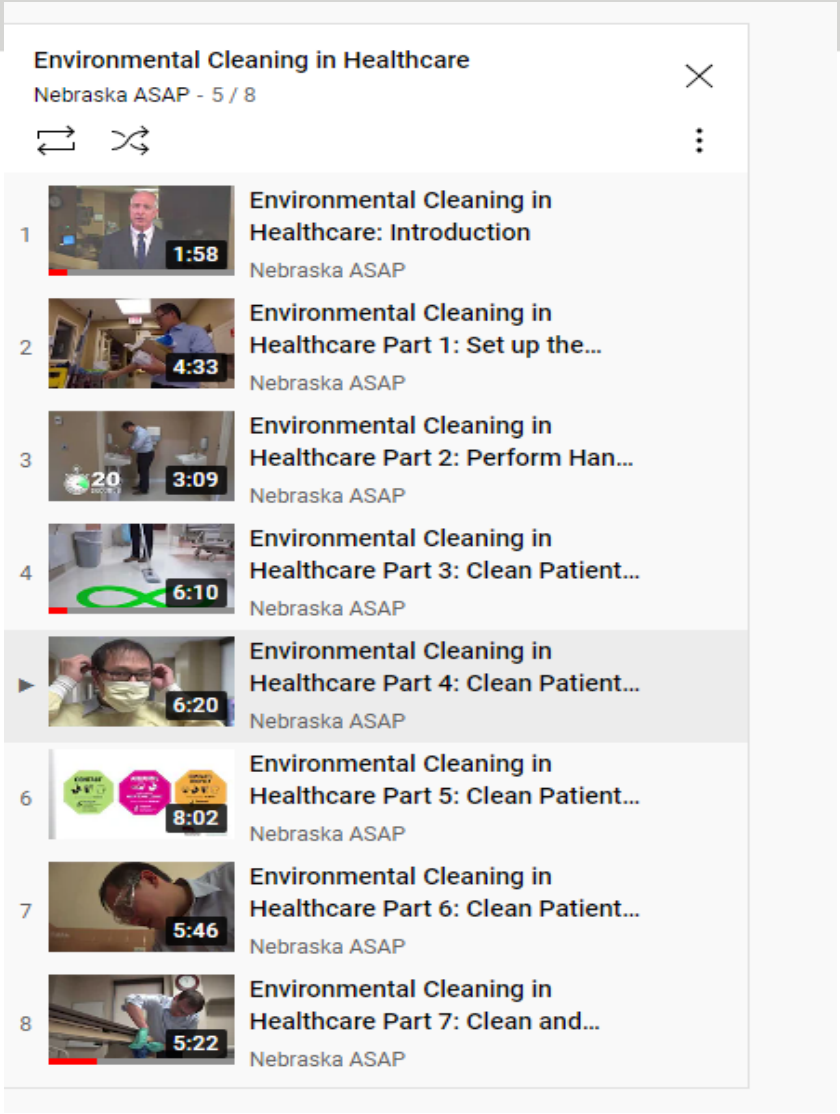
Training

- On the job training
  - How much time can be afforded to ensure tasks and performance can be completed to standard?
    - It can take up to 3 months for frontline staff to fully understand the tasks that are expected of them
- Weekly/Monthly Training
  - Recognize and adapt to turnover
  - Touch on critical competencies over the course of the year, broken up monthly/ quarterly
  - Use as an opportunity to bring up seasonal topics
    - High touch surfaces during flu season

Bauer, Talya N. (2010). *Onboarding New Employees: Maximizing Success*, SHRM Foundation. 1 – 37.

Nebraska ICAP & ASAP Environmental Cleaning in Healthcare, 8 training videos. Access the playlist at https://www.youtube.com/playlist?list=PLUK2nSFZhL9k-a1mc__ksZeTvDUa5he9Q
https://icap.nebraskamed.com/facilities/acute-care/acute-facility-resources/

Training Resource



- Nebraska ASAP and Nebraska ICAP are funded by the Nebraska DHHS HAI/AR program through a CDC grant.
- Training videos are free and do not endorse any specific product.
- They are translated into multiple languages.

Nebraska ICAP & ASAP Environmental Cleaning in Healthcare, 8 training videos. Access the playlist at https://www.youtube.com/playlist?list=PLUK2nSFZhL9k-a1mc__ksZeTvDUa5he9Q or search "Nebraska ASAP Environmental Cleaning in Healthcare – YouTube" or https://icap.nebraskamed.com/facilities/acute-care/acute-facility-resources/

Quality Assurance

Quality Assurance Tips

Prior to any quality observation or monitoring program, it is essential to engage the frontline

1. Provide an overview of the importance of HAIs in a manner commensurate with their educational level using as many pictorial illustrations as is feasible.
2. Explain their role in improving patient safety through optimized hygienic practice.
3. Review specific terminal room cleaning practice expectations.
4. Discuss the manner in which their practice will be evaluated. A participatory demonstration of the monitoring method is very useful.
5. Provide them with information from the baseline evaluation emphasizing or possibly exclusively showing them results for those objects which have been most thoroughly cleaned.
6. Stress the non-punitive nature of the program.
7. Inform them that their good performance will be broadly recognized (i.e., beyond their department) and highlighted within their department for others to emulate.
8. Repeatedly reinforce the importance of their work, and how it directly relates
   - to the healthcare facility's goals and mission
   - how it is appreciated by patients/ residents and plays a major role in everyone's' satisfaction with the facility

CDC: Options for Evaluating Environmental Cleaning
https://www.cdc.gov/infection-control/php/evaluating-environmental-cleaning/

Great Environmental Cleaning is Important Everywhere

Department	Surface examples	Team Members
Clinical care units	Scales, vital signs monitoring carts, radiology equipment, lifts, computers	CNAs, MAs, nursing team, radiology team
Cafeteria and dining	Dining tables, food service surfaces	Dietary team
Patient/ resident rooms	Bedrails, bedside table, doorknobs, hand washing faucets, phone, call light	Housekeeping or clinical team
Spas and bathing rooms	whirlpool seat, temperature control, handheld sprayer	Spa team or clinical team




Cleaning Frequency Risk Assessment

- When determining how often to clean, it might be helpful to perform a risk assessment
- Cleaning of a clinic room won't be the same as an ICU room, an OR room, or a waiting room
- Look at the following for scoring:
  - Probability of contamination *(Heavy, Moderate, Light)*
  - Vulnerability of population *(More or Less Susceptible)*
  - Potential for exposure *(High-Touch or Low-Touch Surfaces)*

https://www.cdc.gov/healthcare-associated-infections/hcp/cleaning-global/appendix-a.html

Monitoring Options

- **Direct Practice Observation**
- **Visual Inspection**
- **Competency Evaluation**
- **Fluorescent Markers**
- **ATP Bioluminescence**
- **Cultures (Swab and Agar Slide)**

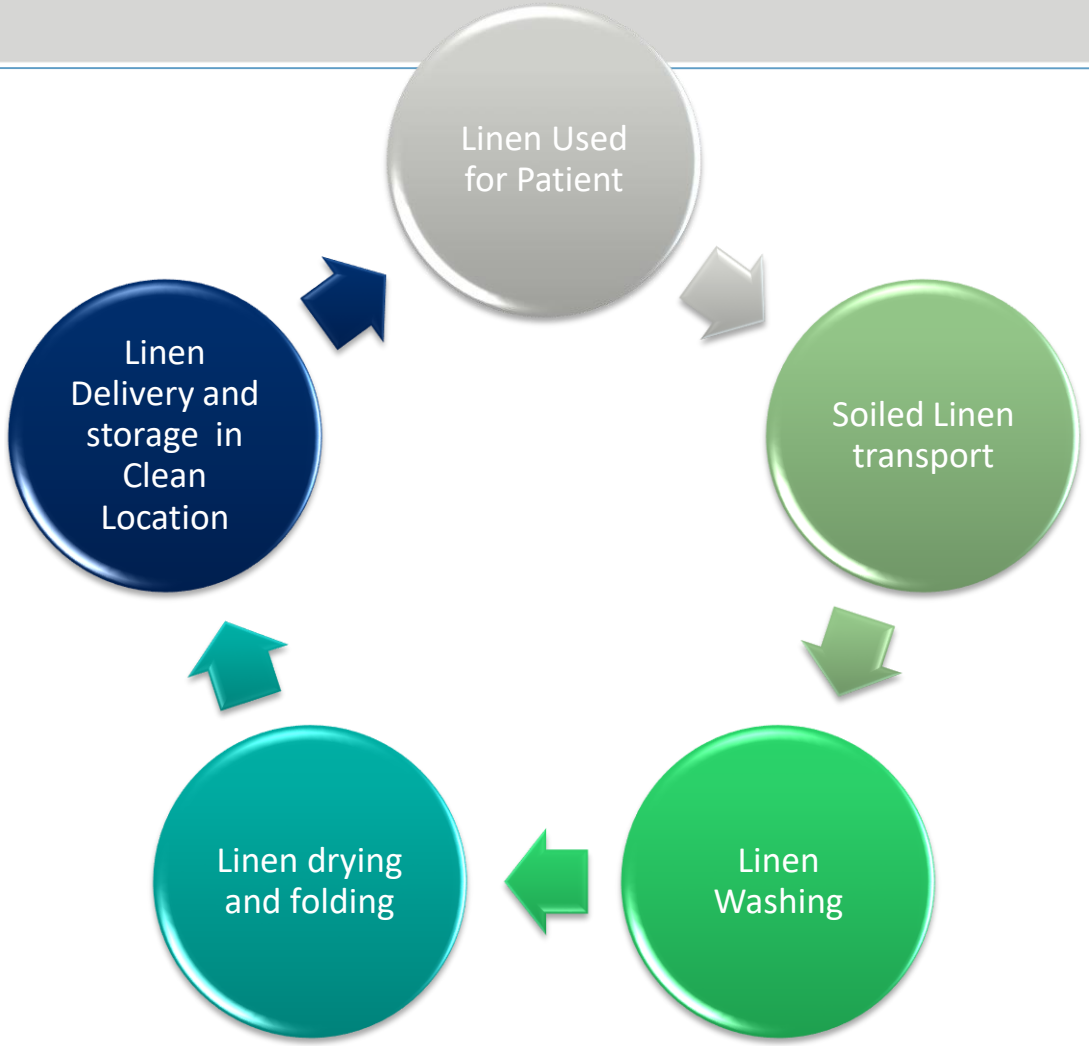
CDC: Options for Evaluating Environmental Cleaning
https://www.cdc.gov/infection-control/php/evaluating-environmental-cleaning/

Reporting and Feedback

- Share results with staff and leadership
  - Ensure staff is clear on who is cleaning what
- Committee Reporting
  - Infection Control Committee
  - Quality Improvement Committee
- Uses for Results
  - Education and Training Opportunities
    - Immediate training and re-training
  - Staff Recognition
  - Quality Improvement Projects

Linen Handling

Linen Handling



Transport of Clean Laundry

The facility practices must include how staff will handle and transport the laundry with appropriate measures to prevent cross-contamination. This includes, but is not limited to, the following:

- Clean linens must be transported by methods that ensure cleanliness and protect from dust and soil during intra or inter-facility loading, transport, and unloading
- Separate carts must be used for transporting clean and contaminated linen.
  - If this is not possible, the contaminated linen cart should be thoroughly cleaned and disinfected per facility protocol before being used to move clean linens

State Operations Manual Appendix PP - Guidance to Surveyors for Long Term Care Facilities – Rev. 225; Issued: 8-8-24, §483.80(e) https://www.cms.gov/medicare/provider-enrollment-and-certification/guidanceforlawsandregulations/downloads/appendix-pp-state-operations-manual.pdf

Transport of Soiled Laundry

- Contaminated linen and laundry bags are not held close to the body when transporting;
- No special precautions (e.g., double bagging) or categorizing (e.g. biohazard, color-coded) for linen originating in transmission-based precaution rooms is necessary;
- Contaminated textiles and fabrics in bags can be transported by cart;
- Double bagging of linen is only recommended if the outside of the bag is visibly contaminated or is observed to be wet through to the outside of the bag;
- Contaminated linen carts must be cleaned and disinfected whenever visibly soiled and according to a schedule developed by the facility.

Laundry Processing

Washing/drying processes includes the use of manufacturer's instructions for use (IFU) for laundry additives and equipment maintenance.

- The facility staff must prevent contamination of laundry in processing areas
- Availability and use of hand hygiene products, as well as appropriate PPE (i.e., gloves and gowns) while sorting and handling contaminated linens;
- The receiving area for contaminated textiles is clearly separated from clean laundry areas. Workflow should prevent cross-contamination;
- Laundry equipment (e.g., washing machines, dryers) is used and maintained according to the manufacturer's IFU to prevent microbial contamination of the system;
- Laundry detergents, rinse aids or other additives are used according to the manufacturer's IFU.

Linen Storage

Facility practices must address linen storage, and should include but are not limited to:

- Covers are not needed on contaminated textile hampers in resident care areas (unless state licensing rules require them)
- Clean linen must always be kept separate from contaminated linen.
  - The use of separate rooms, closets, or other designated spaces with a closing door provides the most secure methods for reducing the risk of accidental contamination.

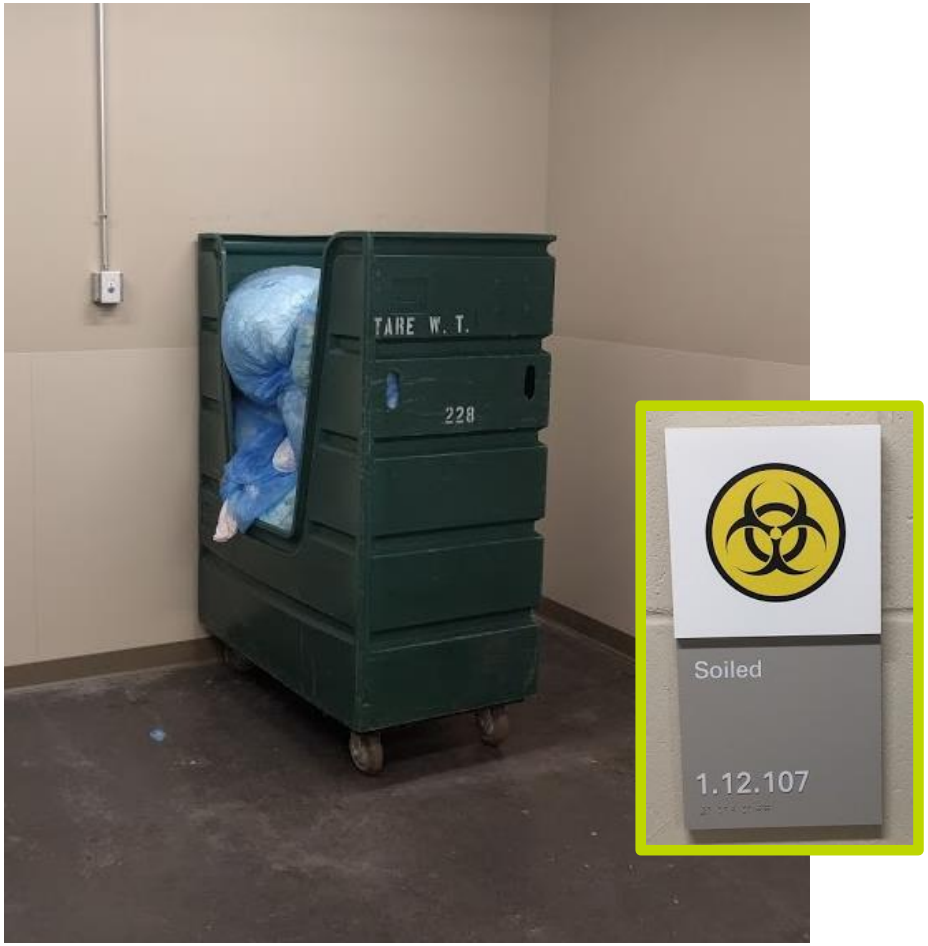
CDC - Guidelines for Environmental Infection Control in Health-Care Facilities (2003) - Background G. Laundry and Bedding https://www.cdc.gov/infection-control/hcp/environmental-control/laundry-bedding.html

CMS Memo S&C 13-09-NH https://www.cms.gov/medicare/provider-enrollment-and-certification/surveycertificationgeninfo/downloads/survey-and-cert-letter-13-09.pdf

Linen: Separation of Clean & Dirty

Clean Linen Staging Area

Storage of Contaminated/ Dirty Linen



Questions?