Nebraska Hospital Association C. *difficile* Best Practices: Testing to Containment to Treatment Webinar Series

Session #3: Strategies to Improve Environmental Cleaning

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ICAP
Infection Control Assessment and Promotion Program

NEBRASKA
Good Life. Great Mission.
DEPT. OF HEALTH AND HUMAN SERVICES

NHA CDI Webinar Series

Program Overview

The Nebraska Hospital Association in partnership with ICAP / ASAP / DHHS will be hosting a 5-part webinar series focused on C. Difficile best practice. Experts in the field will review best practices in the infection prevention ecosystem for testing, containment, and treatment of C. Difficile infections in both urban system hospitals, as well as rural and Critical Access Hospitals.

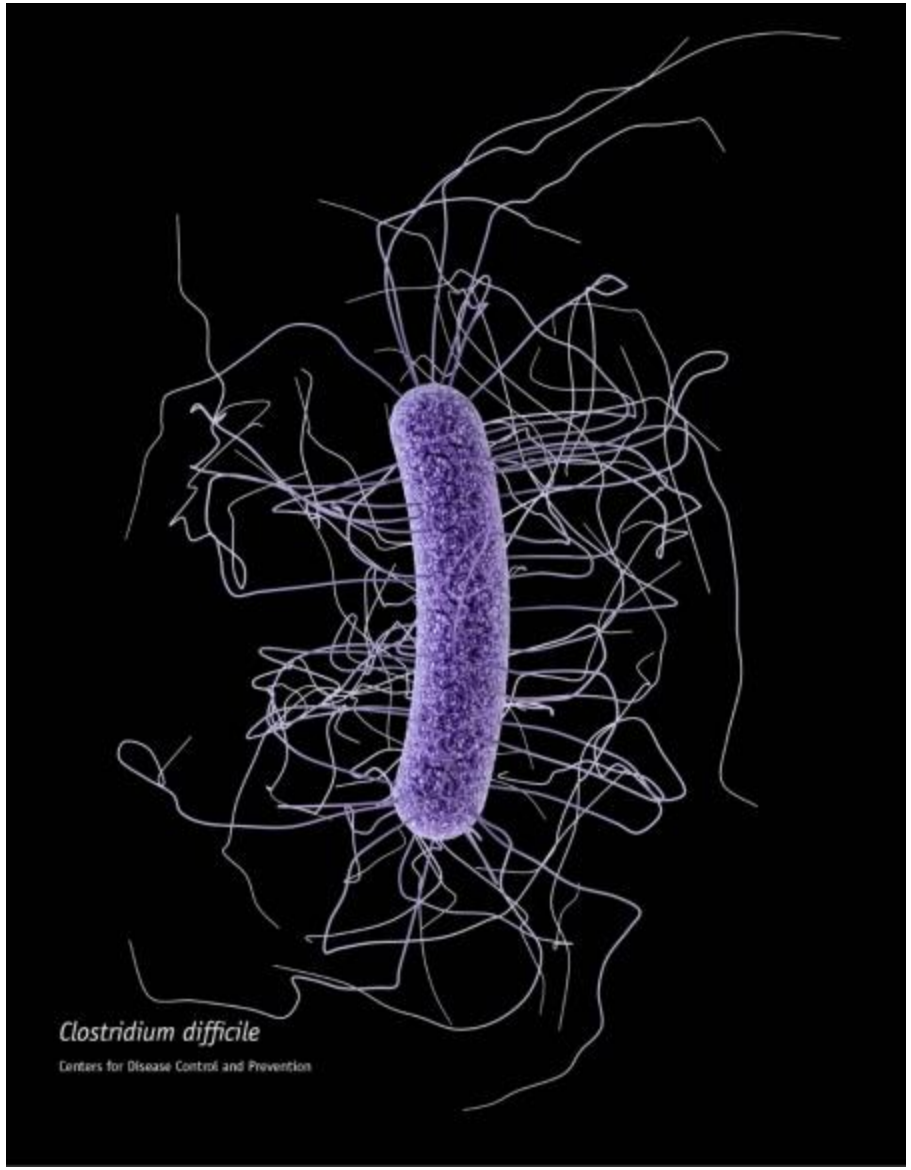
Target Audience

C-Suite; Quality Leaders/Staff; Nursing Leaders/Staff; Pharmacy Leaders/Staff; Infection Preventionists; Providers; Laboratory; Information Technology / Clinical Informaticist

Strategies to Improve Environmental Cleaning

Learning Objectives

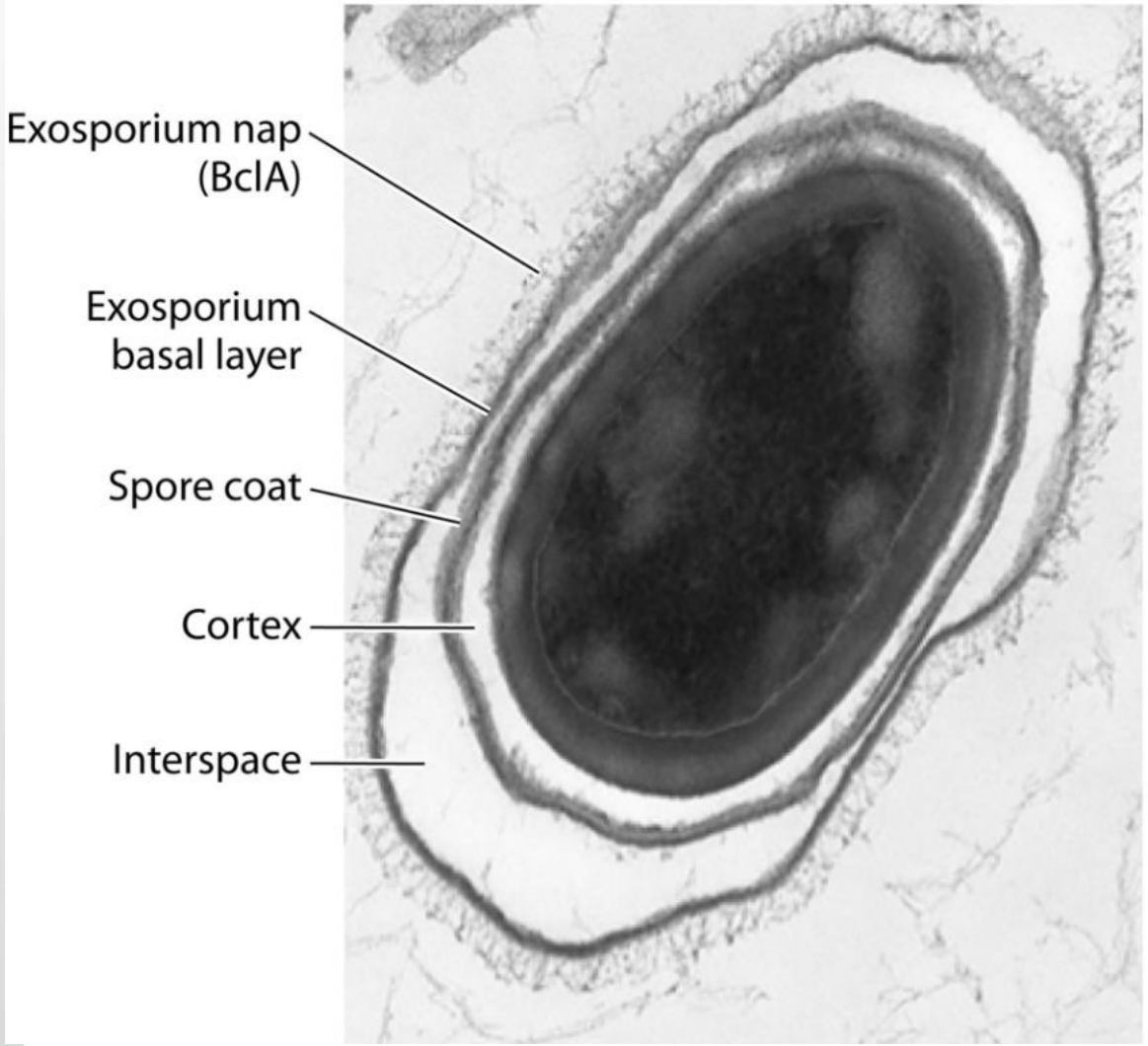
- Understand appropriate cleaning products for CDI infections
- Address high-touch surfaces cleaning
- Discuss terminal cleaning practices
- Identify cleaning audit tools



Spores…What is the big deal?

Image: Tennessee Department of Health [Healthcare-Associated Infections Clostridium difficile (tn.gov)]

Bacterial spores

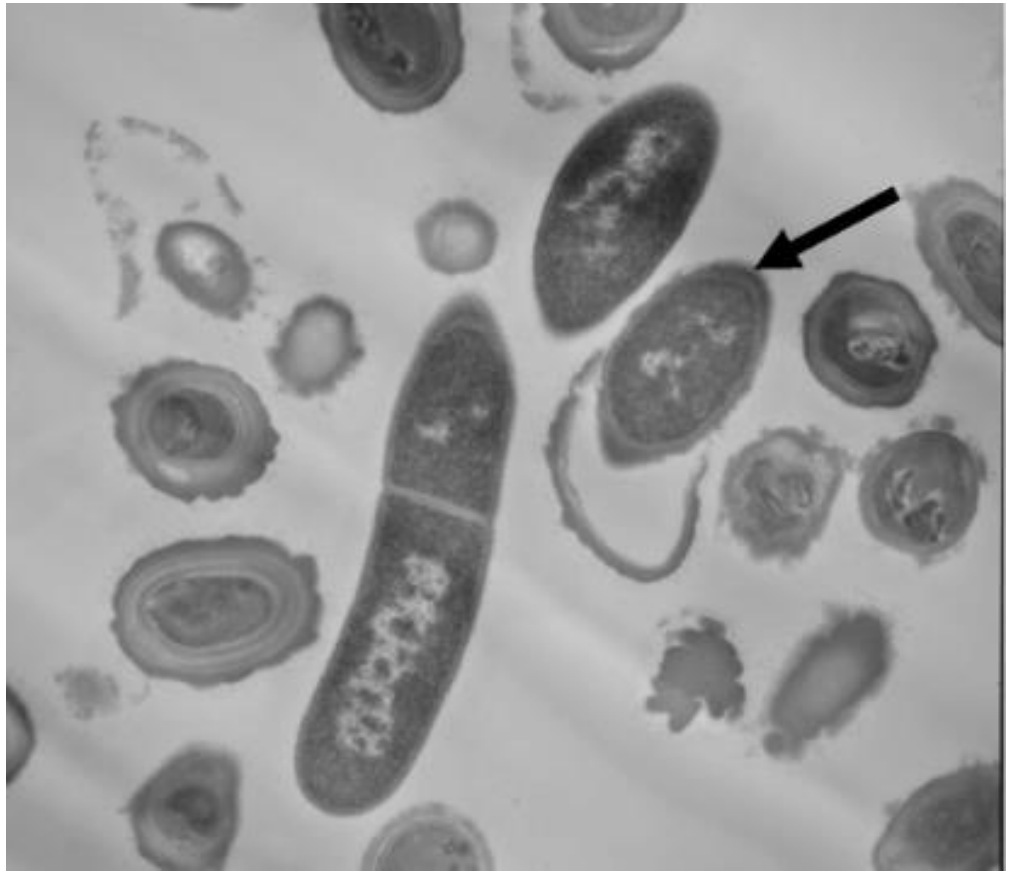


Examples also include:

- *Bacillus anthracis*, Anthrax
- *Bacillus cereus*, food poisoning
- *Clostridium botulinum*, Botulism

The Exosporium Layer of Bacterial Spores: a Connection to the Environment and the Infected Host, Microbiology and Molecular Biology Reviews
https://journals.asm.org/doi/10.1128/mmbr.00050-15

The “easy to kill organisms” die-off quickly



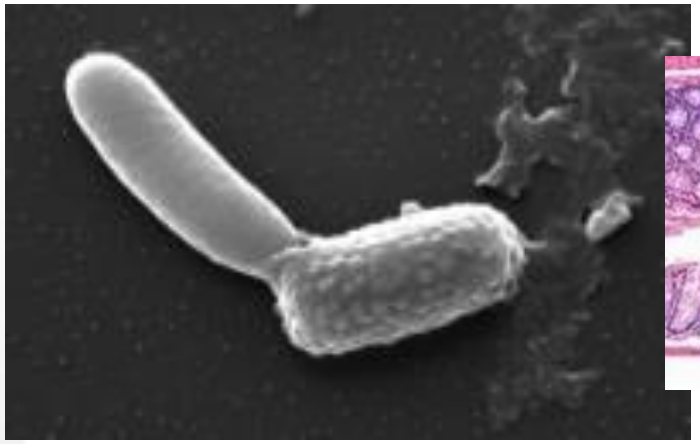
Clostridioides difficile, or C. *diff*, is an obligate anaerobe

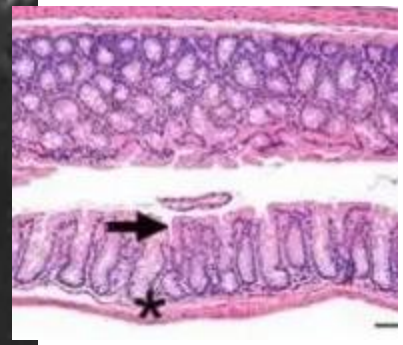
The vegetative cells die in 10 to 15 minutes after exposure to ambient air†

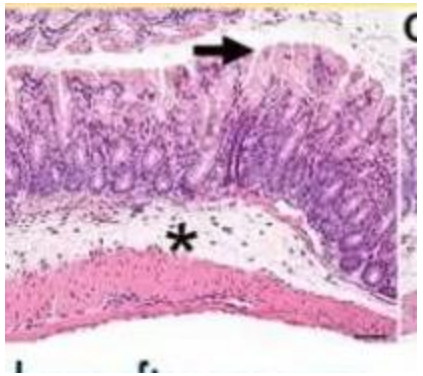
So, we understand that what we encounter in the healthcare environment, via surface contamination, will most likely be the spore form

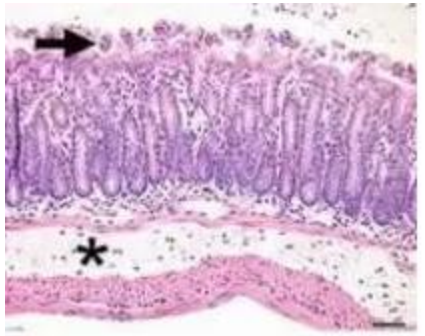
† CDC Strive Training CDI 101: C. difficile Infection (CDI)

Picture: Imaging Clostridioides difficile Spore Germination and Germination Proteins, Baloh, M, Nerber, HN, Sorg, JA. Journal of Bacteriology. 28 June 2022 https://journals.asm.org/doi/10.1128/jb.00210-22









Germinating C. difficile spores develop into vegetative cells inside the protective coat and exosporium layers

24 hours after exposure cells of the colon are normal

30 hours after exposure C. difficile toxin has started to damage cells

Inflammation and fluid build-up is triggered

36 hours after exposure inflamed cells burst and die

C. difficile spores leave the colon via diarrhea and await the next host

Imaging Clostridioides difficile Spore Germination and Germination Proteins, Baloh, M, Nerber, HN, Sorg, JA Journal of Bacteriology. 28 June 2022 https://journals.asm.org/doi/10.1128/jb.00210-22
Study Reveals how C difficile disupts the gut. Medical News Today https://www.medicalnewstoday.com/articles/289817

ICAP

What are the steps to prevent spread?

Implement an environmental cleaning and disinfection strategy

- Ensure adequate cleaning and disinfection of environmental surfaces and reusable devices, especially items likely to be contaminated with feces and surfaces that are touched frequently.
    - Ensure daily and terminal cleaning of patient rooms.
        - Identify high-touch surfaces in the environment
- Use an Environmental Protection Agency (EPA)-registered disinfectant with a sporicidal claim for environmental surface disinfection after cleaning in accordance with label instructions. (Note: Only hospital surface disinfectants listed on EPA's List K are registered as effective against *C. diff* spores).

FAQs for Clinicians about C. diff | CDC

Eliminating a spore

- Spores can be inactivated by high temperature, such as cooking (food industry) or steam sterilization (instrument reprocessing)
- Irradiation is used in food processing
    - a process of preserving food in which food are exposed to appropriate doses of ionizing radiation in order to kill insects, molds and other potentially harmful microbes and allergens. The radiation doses could be high, low or medium depending on the products to be irradiated and the target organism to be eradicated
- Physical cleaning removes spores, vegetative surfaces, and debris form surfaces
- Chemical disinfection

Note: Pasteurization does not kill spores, that is why pasteurized foods are typically kept in refrigerators

Action	What does it do?	Ingredient
Cleaning	Removes dirt, organic material, and grease from surfaces	Soap, Detergent, Surfactants See EPA guide https://www.epa.gov/pesticide-registration/determining-if-cleaning-product-pesticide-under-fifra
Disinfecting	Kills viruses and bacteria on surfaces using chemicals	Pesticides, chemical disinfectants, See EPA List K https://www.epa.gov/pesticide-registration/list-k-antimicrobial-products-registered-epa-claims-against-clostridium

Table adapted from EPA "What's the difference between products that disinfect, sanitize, and clean surfaces?" Link here

Sporicidal Disinfectants

List K: Antimicrobial Products Registered with EPA for Claims Against Clostridium difficile Spores | US EPA

Using EPA List K

Check if a Product is on List K

1. First, find the EPA registration number on the product label. Look for “EPA Reg. No.” followed by two or three sets of numbers, as described above.
2. On the Disinfectant list, search the registration number exactly as it appears on the label.
3. Once you see the results on the disinfectant list, make sure to check that the product's label includes directions for use against C. diff.
4. Regardless of whether you are using a primary registration product or a supplemental distributor product, always check the label has the corresponding directions for use for the relevant pathogen.

Disinfectant products and Registration numbers

- Registration numbers will have two or three parts.
- The first two parts of this registration number reflect the primary registration, while the third part of the registration number identifies the distributor’s EPA company number.
- If your product's registration number has two parts (ex. 1234-12), it has a primary registration number. If this number is on List K, the product is qualified for use against C. diff
- If your product's registration number has three parts (ex. 1234-12-123), you have a supplemental distributor product. These products have the same chemical composition and efficacy as primary products, but often have different brand or product names. If this number is on List K, the product is qualified for use against C. diff.

Common Sporicidal Disinfectants

Sporicidal Chemical Category	Examples of Product Names*
Sodium Hypochlorite	Tumult; Clorox Regular Bleach1; Cavicide Bleach; Pure Bright Germicidal 160 Bleach
Hydrogen Peroxide; Peroxyacetic acid (Peracetic acid)	SSS Sporicidal Disinfectant Cleaner; VigorOx CR; Peridox RTU
Hydrogen Peroxide; Peroxyacetic Acid (Peracetic Acid); Caprylic Acid	Oxycide Daily Disinfectant Cleaner; Virasept

List K: Antimicrobial Products Registered with EPA for Claims Against Clostridium difficile Spores | US EPA

*NE DHHS/NE ICAP does not endorse any product or brand. Products and brands identified are for informational purposes only.

- Primary label
- Dilution/mixing (if required)
    - Labeling secondary container

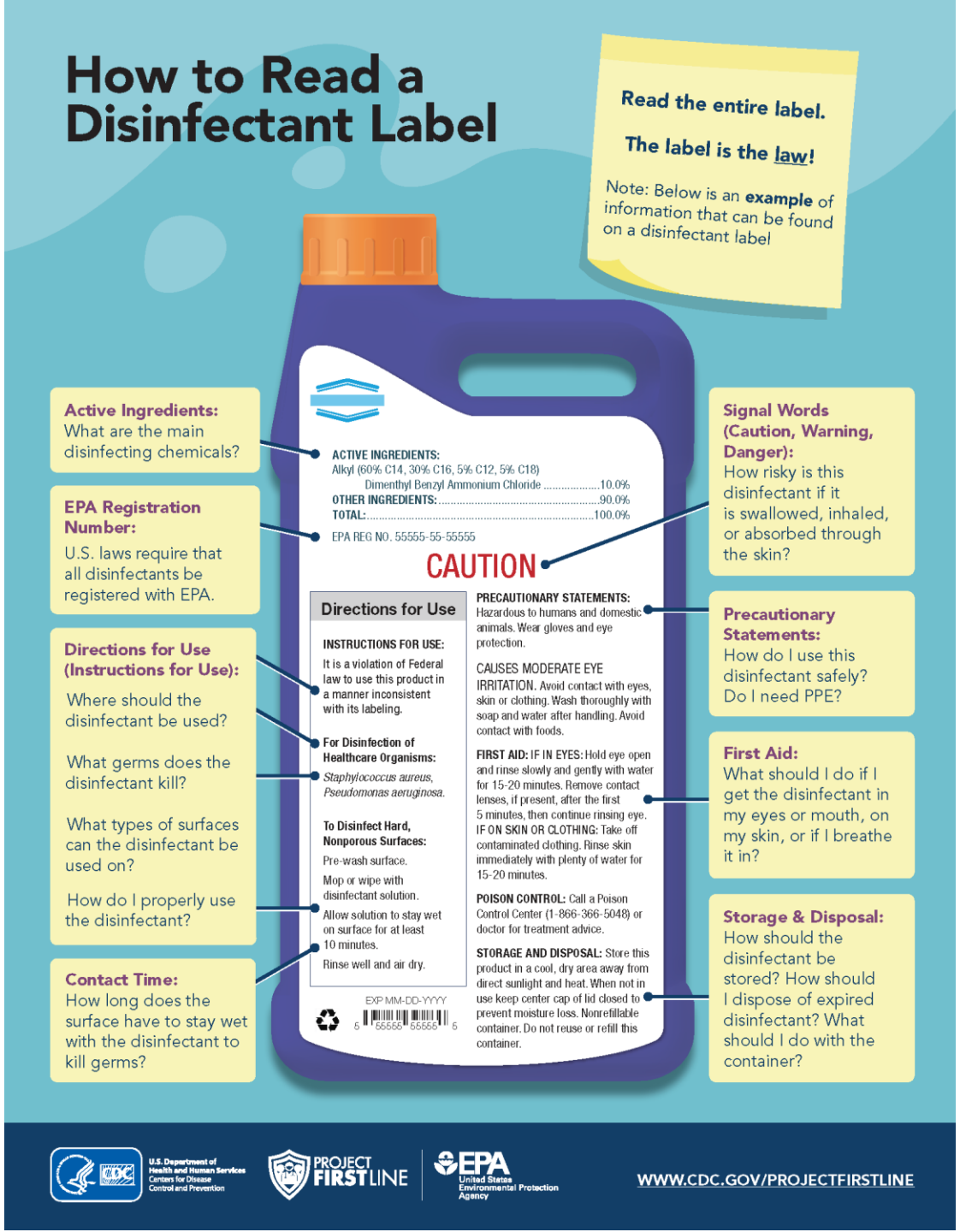


Image: HowToReadALabel-508c-Final-2022-08-30 (005)_1.png (1700×2200) (epa.gov)

How C. diff is Transmitted: Fecal Oral Route

Image: Prevent the Spread of C. diff | CDC
FAQs for Clinicians about C. diff | CDC

How C. diff is Transmitted: Environmental Contamination Route

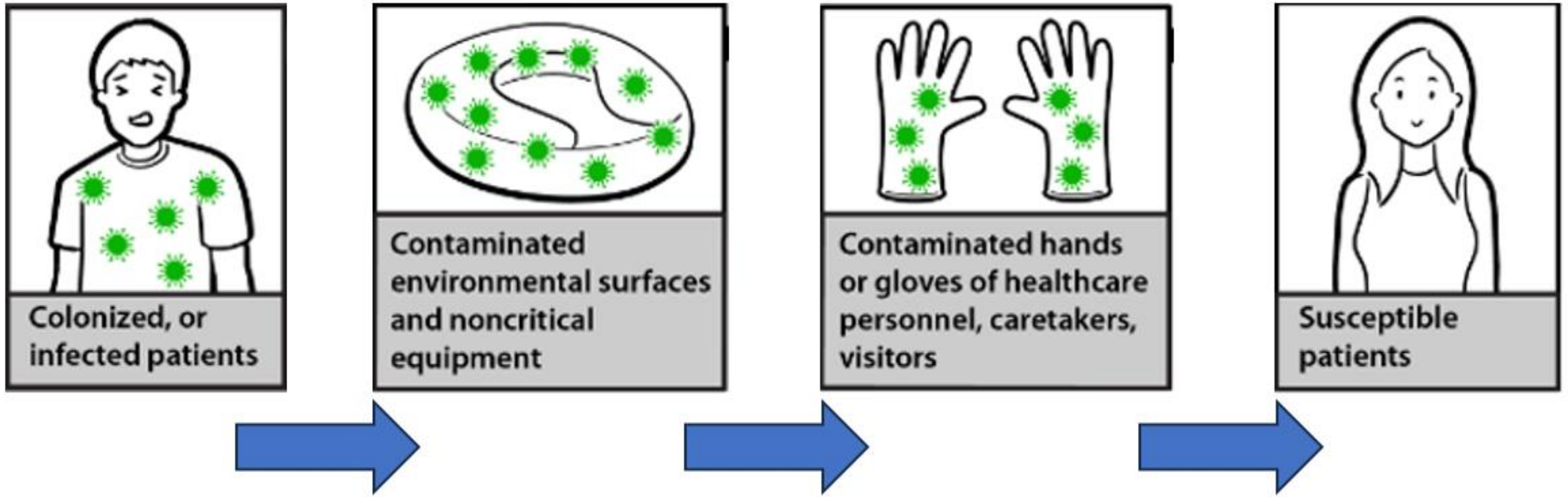


Image: Introduction | Environmental Cleaning in Global Healthcare Settings | HAI | CDC

Interrupt Environmental Transmission of HAIs

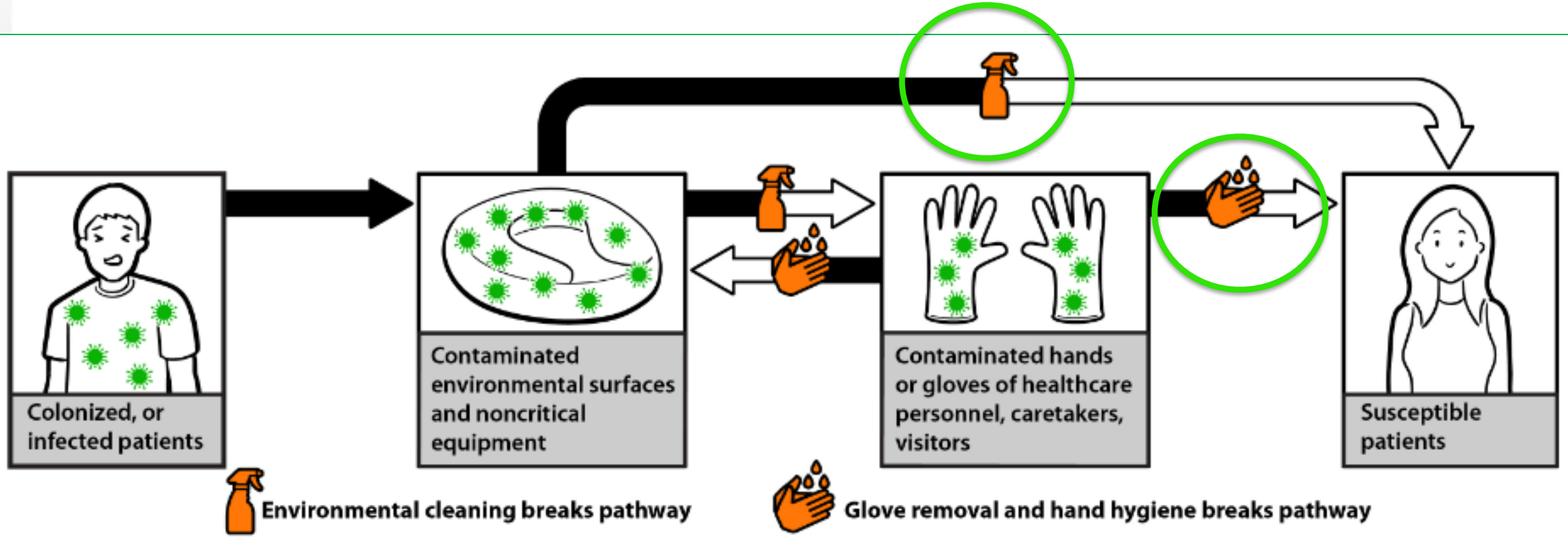


Image: Introduction | Environmental Cleaning in Global Healthcare Settings | HAI | CDC

CDI: Daily Cleaning

Key items to remember:

- Pay attention to isolation sign outside of the patient room
- Don PPE according to the isolation precautions
  - CDI: Gown, gloves, eye protection
- If unsure, communicate with direct care staff

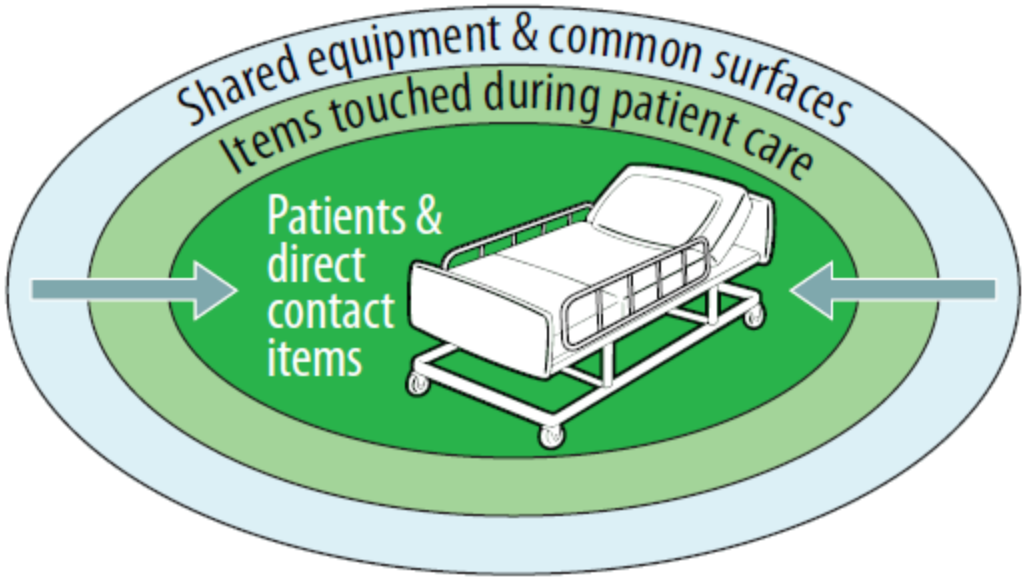
APIC, AHE, and CDC Strive Program: Environmental Services: Surface Cleaning and Disinfection Procedures and Techniques in EVS, Infographic on cleaning occupied rooms

Occupied Room: Cleaning Responsibilities

Type of Clean	Frequency	Staff Responsible	Products/Technique	Additional Guidance
Routine	At least daily	EVS staff	Sporicidal product • High-touch surfaces in patient zone • Patient bathroom/toilet	General room equipment/furniture
Routine	At least daily	Direct care staff	Sporicidal product • Pt. care equipment	IV pole/pumps, sequential compression pump (SCD), computers, barcode scanning devices, lifts
Additional considerations: Can include pictures of equipment for reference and keep on EVS cart (laminated)				

Appendix B1 General Patient Areas | Environmental Cleaning in Global Healthcare Settings | HAI | CDC

Occupied and Terminal: High Touch Surfaces

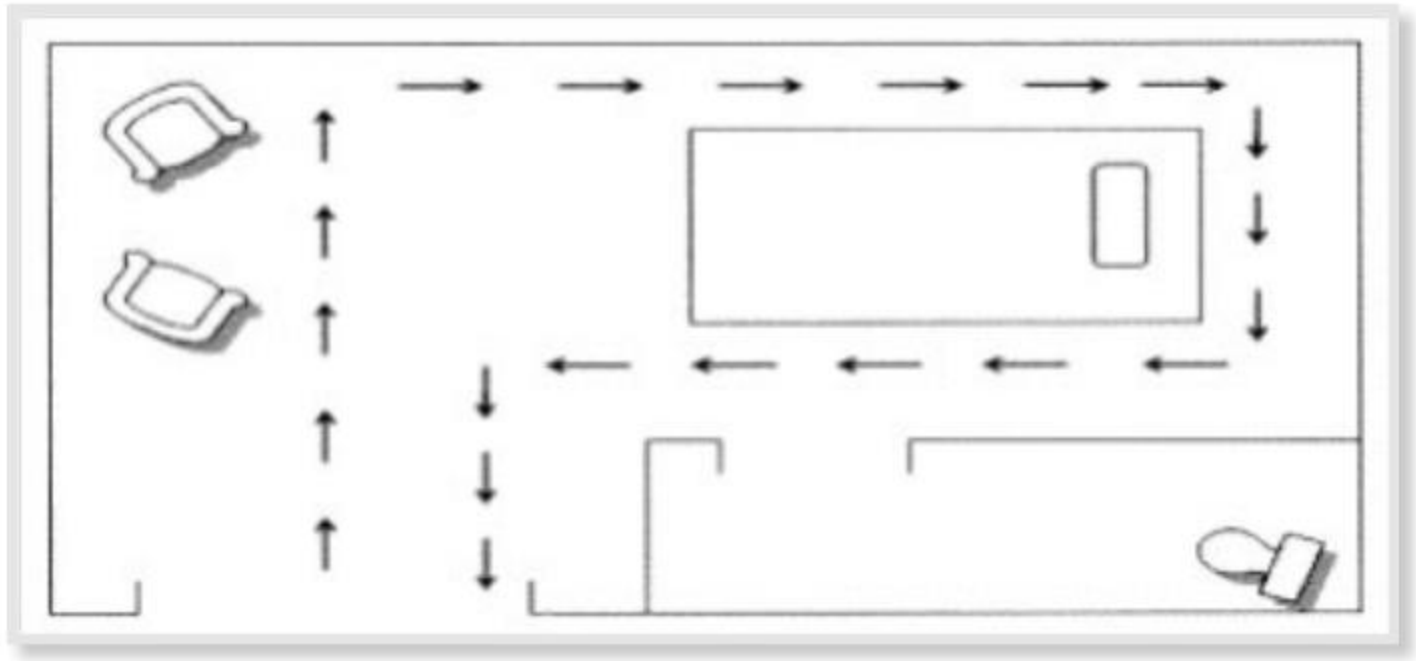


High touch surfaces include, but are not limited to:

- Bed rails and control buttons
- Bed frames
- Tray table
- Bedside table
- Call light
- Phone (land line)
- Computer keyboard
- Door handles
- Light switches
- Toilet handle/seat
- Patient chair
- IV poles
- Blood-pressure cuff

Environmental Cleaning Procedures | Environmental Cleaning in Global Healthcare Settings | HAI | CDC

Occupied and Terminal: Room Cleaning Pathway



Patient room:

- Clockwise
- Cleanest to dirtiest
- High to low
- Floor

Patient restroom (done after pt. room)

- Clockwise
- Cleanest to dirtiest
- High to low
- Toilet
- Floor

Minnesota Hospital Association: Environmental Services Cleaning Guidebook

CDI: Terminal Cleaning

Before terminal room cleaning:

- Change room status to "in progress"
- Always perform hand hygiene
- Don appropriate PPE
- Remove all soiled linen
- Wipe down equipment with disinfectant and then remove from room
- Remove linen from bed and place into linen hamper
- Remove any patient equipment from room per hospital procedure, place IV poles with bags on them by door and notify nursing staff
- Remove oxygen tubing and make sure oxygen is off
- Check room for previous patient belongings – take any items to the nursing station
- Check Sharps container. Change if necessary.
- Empty the trash container. Handle plastic bags from the top.
- Discard open facial tissue boxes and used toilet paper rolls.

Minnesota Hospital Association: Environmental Services Cleaning Guidebook

Image: The Solution (bedtechs.com)

Communicating disinfection needs

How do colleagues in your facility know about need for isolation and disinfection of mobile medical equipment?

* EKG * X ray * Meal trays * wheelchairs

How is the disinfectant type communicated to the Environmental Services/ Housekeeping team?

How is isolation need communicated for ancillary care colleagues?

Multiple strategies may be needed:

- Infection status flags
- Reports from EHR
- Direct report and phone call
- Physical signage

Providence Alaska Medical Center Isolation Signage example Link here

Example: Terminal Room Cleaning Form

- Perform high dusting with an extending lambs wool duster all areas above shoulder height. This includes but is not limited to the following items:

- [ ] Television (cabinet, screen and wires)
- [ ] Clock
- [ ] Drape rod
- [ ] Blinds
- [ ] Cubical curtain tracks
- [ ] Vents
- [ ] Area where ceiling meets the wall.
- [ ] Ledges
- [ ] Lights (patient room and bathroom)
- [ ] Sprinkler heads
- [ ] Clean patient bed

- Clean and disinfect the patient bed using disinfectant cleaner and blue cleaning rags. Change rags as needed to ensure saturation. Raise foot and head of bed before starting.

- [ ] Hand rails – high touch area
- [ ] Mattress – top and bottom
- [ ] Pillows – place cleaned pillow back on mattress
- [ ] Foot and headboard
- [ ] Exposed frame, springs or bed panels
- [ ] Base and wheels
- [ ] Discard your rag and proceed with a clean one after cleaning the bed.

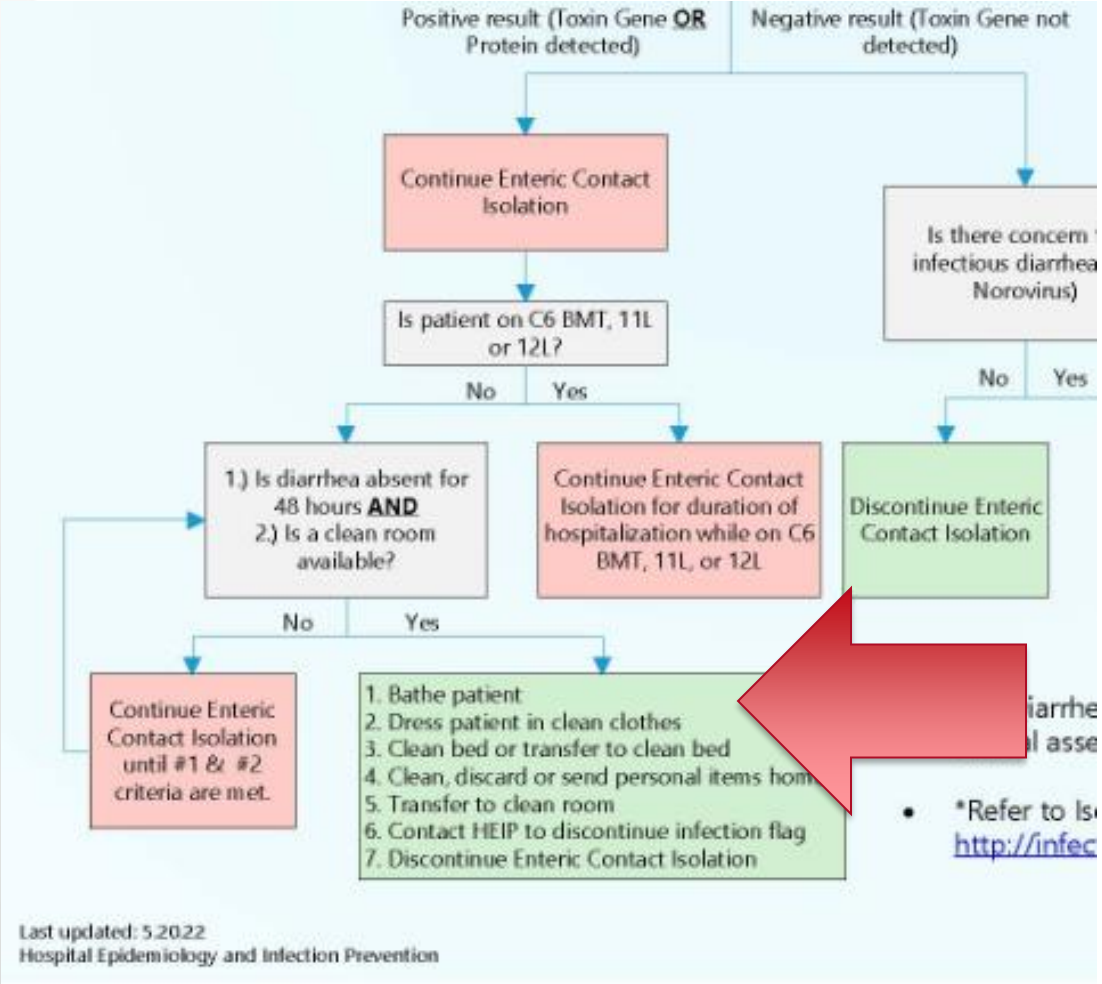
Minnesota Hospital Association: Environmental Services Cleaning Guidebook

Monitoring Options

- Direct Practice Observation
- Fluorescent Markers
- ATP Bioluminesence
- Swab Cultures
- Agar Slide Cultures

CDC: Options for Evaluating Environmental Cleaning
https://www.cdc.gov/hai/toolkits/appendices-evaluating-environ-cleaning.html

Special practices for long-stay patients



General criteria for discontinuing contact precautions:

- After resolution of symptoms, patients with CDI can continue to shed C. difficile in stool and contaminate the environment.
- In addition, these patients are at high risk for recurrent CDI after treatment is stopped.
- Currently, data do not exist to support extending contact precautions as a measure to decrease CDI incidence.
- Therefore, extending contact precautions until discharge for all patients with CDI remains an additional approach.

Strategies to prevent Clostridioides difficile infections in acute-care hospitals: 2022 Update

Section “e. Criteria for discontinuing contact precautions” link here

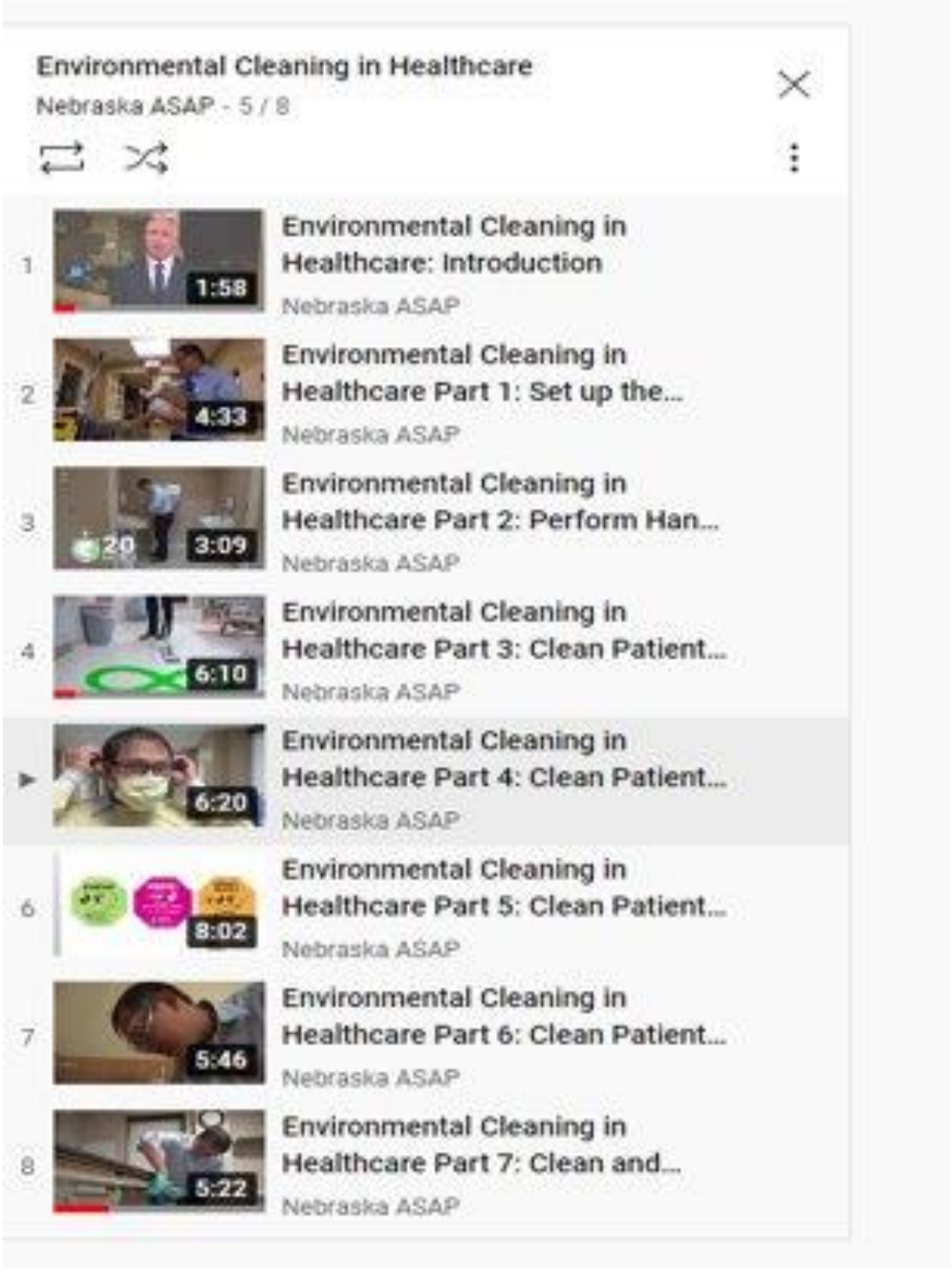
Diarrhea Decision Tree | UCSF Health Hospital Epidemiology and Infection Prevention (ucsfmedicalcenter.org)

Nebraska ICAP Project 2016-2017

Impact of Training on Quality

ICAP project on audit and feedback

Nailon, R., et al. Impact of an Audit and Feedback Program on Environmental Cleaning and Disinfection in Critical Access Hospitals and Long-term Care Facilities. Presented at National APIC 2018 https://icap.nebraskamed.com/wp-content/uploads/sites/2/2022/06/Novel-EVS-poster-APIC-5.15.18.pdf



Environmental Cleaning 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.

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"

Sporulation References

Mechanisms and Applications of Bacterial Sporulation and Germination in the Intestine - PMC (nih.gov)

Clostridioides difficile Spore Formation and Germination: New Insights and Opportunities for Intervention | Annual Review of Microbiology (annualreviews.org)

Clostridium difficile spore biology: sporulation, germination, and spore structural proteins - PMC (nih.gov)

Clostridium difficile Infection - PMC (nih.gov)

Sporulation: How to survive on planet Earth (and beyond) - PMC (nih.gov)

Additional References

Environmental Cleaning and Decontamination to Prevent Clostridioides difficile Infection in Health Care Settings: A Systematic Review - PMC (nih.gov)

AHE Resource Repository | AHE

Environmental Cleaning Procedures | Environmental Cleaning in Global Healthcare Settings | HAI | CDC

Appendix B1 General Patient Areas | Environmental Cleaning in Global Healthcare Settings | HAI | CDC