Cleaning, Disinfection and Reprocessing Reusable Equipment

Last Updated 2019

Basics of Infection Prevention
Healthcare-Associated Infections Program
Center for Health Care Quality
California Department of Public Health

Objectives

- Describe the role of the environment in transmitting infections
- Discuss strategies to ensure effectiveness of cleaning and disinfection
- Discuss reprocessing of reusable medical equipment and devices
- Demonstrate use of adherence monitoring tools and feedback
- Identify determinant's for low, intermediate, and high level disinfection
- Review examples of non-critical, semi-critical, and critical devices
- Discuss methods for sterilizing instruments
- List areas where infection prevention environmental assessments should be performed

Role of Environmental Surfaces in Disease Transmission

Contaminated Environmental Surface Leading to Patient/Resident Infection

1. Surface must become contaminated by contact or droplet spread
2. Organism must survive on the surface
3. Surface must be touched by another person who picks up sufficient inoculum
4. Person must omit or poorly perform hand hygiene
5. Person must transmit the organism to another person or object in sufficient quantity to cause disease

The Inanimate Environment. , Bennett & Brachman's Hospital Infections 6th Ed. 2014
Chou. APIC Text of Infection Control & Epidemiology. 2013
HICPAC /CDC Isolation Guidelines. 2007

Pathogen Survival in the Environment

- Multiple factors influence duration of survival:
  - Type of microbe
  - Temperature
  - Humidity
- C.difficile spores are shed in high numbers, are resistant to desiccation and some disinfectants, and can live on surfaces for up to 5 months

Kramer et al. BMC Infect Dis. 2006

Evidence of Environment Playing a Role in Disease Transmission

- Admission to a room previously occupied by a colonized or infected patient is a significant risk factor for infection
- *C.difficile* acquisition
  - 11% patients admitted to an ICU room previously occupied by a CDI patient developed CDI
  - 4.6% patients admitted to a room without a prior CDI positive occupant developed CDI

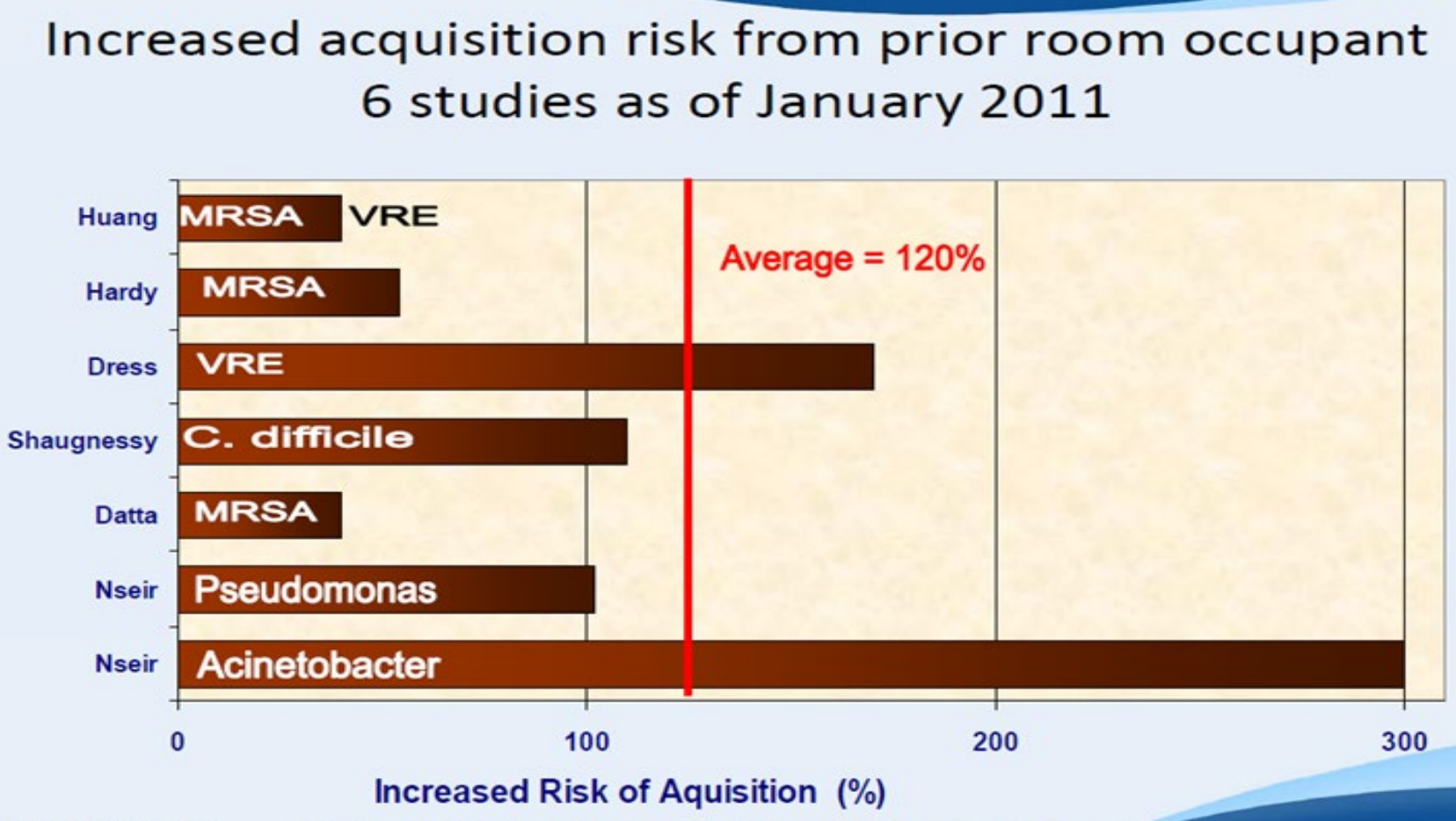
http://www.idse.net/download/HAI_IDSE13_WM.pdf

Weber DJ et.al. AJIC 2013

Shaughnessy et al. Infect Contr Hosp Epidemiol. 2011

California Department of PublicHealth

Increased Acquisition Risk from Prior Infected Room Occupant



·Carling PC, Bartley JM. Am J Infect Control 2010;38 S41-50.

Effective Cleaning Strategies

How to Reduce Environmental Bioburden

- Clean and disinfect high-touch surfaces daily
- Improve cleaning and disinfection of rooms after discharge of patients/residents known to carry healthcare-associated pathogens
- Clean and disinfect portable equipment
- Improve cleaning and disinfection of all rooms

Donskey. AJIC. 2013

Cleaning Policy Considerations

- Include in policy the surfaces and equipment that can reasonably be expected to be contaminated by bacteria (high touch surfaces)
  - Bedrail
  - Call bell
  - Light switches
  - Doorknobs
  - TV remote
  - IV pump
  - Toilet, commode chair
  - IV poles
  - Computer keyboard
  - Telephone
  - Over bed table
  - Respiratory and other bedside equipment
  - Chairs
- Define responsibility and frequency for cleaning and disinfecting patient care equipment and surfaces

Cleaning *Before* Disinfection

- Cleaning removes large numbers of microorganisms from a surface that would otherwise interfere with the disinfection process
- Disinfectants are not as effective in the presence of organic material

Important: A thorough cleaning must occur before a surface can be disinfected!

HICPAC /CDC 2003
HICPAC /CDC 2008

Detergents and Disinfectants

- Detergent
  - Used for cleaning
  - Contains surfactants; lifts dirt
  - Can become easily contaminated, does not kill microorganisms
  - Less toxic, generally less odor, less costly than disinfectant
- Disinfectant
  - Inhibit growth or kill microorganisms
  - More toxic, more costly than detergent

http://hygienesolutions.com/wp-content/uploads/2015/09/Emerging-Pathogens-Enviromental-Cleaning.pdf

Chou. APIC Text of Infection Control & Epidemiology. 2013

EPA Label Claim for Disinfectant

- The EPA label claim states if the product is
  - Virucidal
  - Bactericidal
  - Tuberculocidal
  - Fungicidal
  - Sporicidal
- Clarifies manufacturer's instructions for use, including wet contact time required to achieve the desired degree of microbial killing

CDC. MMWR. Dec 19, 2003
http://hygienesolutions.com/wp-content/uploads/2015/09/Emerging-Pathogens-Enviromental-Cleaning.pdf
Rutala et al. ICHE. 2014

Importance of Wet Contact Time

- Wet contact times is the time required for a disinfectant to kill microorganisms on a pre-cleaned surface
- Disinfectant must remain wet long enough to achieve the claimed level of surface disinfection
- Follow manufacturer's guidelines for achieving the appropriate wet contact time

Rutala et al. ICHE. 2014

Selection of Disinfectant

Disinfectant	Strengths	Concerns
Quaternary Ammonium Products (Quats)	• Widely used • Bactericidal, fungicidal, virucidal • Hospital-grade quats tuberculocidal • Safe for computer keyboards	• Hard water can reduce effectiveness • Generally not sporicidal • Occupational asthma documented
Phenolics	• Bactericidal, virucidal, fungicidal, tuberculocidal • Not sporicidal	• Absorbed by porous materials • Can irritate tissue • Unsafe for use in nurseries
Chlorine-based	• Broad antimicrobial activity • Does not leave toxic residues • Inexpensive • Fast acting • Removes dried organisms, biofilms	• Can cause eye irritation, gastric burns • Inactivated by organic matter • Discolors fabrics • Wet contact time 10 minutes • Corrosive in high concentrations • Can release toxic chlorine gas when mixed with ammonia
Hydrogen peroxide, Accelerated H_2O_2	• Effective • Bactericidal, virucidal at 30- 60 sec • Fungicidal at 10 min • Low EPA toxicity rating	• Expensive

- Consider duration of contact time

Why Bleach for *C. difficile*?

- C. difficile spores are difficult to kill and adhere to environmental surfaces for extended periods
- Use of a 1:10 dilution of bleach (500 ppm) for cleaning
  - Reduces surface contamination
  - Instrumental in outbreak control

Note: Alternatives to bleach are available. For EPA-approved disinfectants with label claims for killing C. difficile spores, see

http://www.epa.gov/oppad001/chemregindex.htm

Hota. CID. 2004.
CDC. MMWR. Dec 19, 2003
Rutala et al. Clinical Micro

Best Practices for Cleaning a Room

- Ensure cleaning **equipment and supplies are clean**
- Ensure **proper use of cleaning and disinfecting products**
- Ensure proper **hand hygiene** and use of **gloves**
- Focus on **frequently touched surfaces**
  - See example list in CDC Environmental Cleaning Toolkit

https://www.cdc.gov/hai/toolkits/Evaluating-Environmental-Cleaning.html

Best Practices for Cleaning a Room -continued

- Avoid generating aerosols
- Change cleaning cloths
- ***Remember***: A surface must be physically cleaned before it can be disinfected
- **Communicate** issues to your supervisors

http://www.healthunit.org/professionals/resources/2013_environmental_cleaning.pdf

Ensure Environmental Cleaning Staff Perform Hand Hygiene

- Emphasize the importance of hand hygiene for all staff in infection prevention
- Change perception that hand hygiene is to protect staff -> hand hygiene is to protect the patient/resident
- Orient EVS staff thoroughly to infection control principles and practices prior to starting work in a clinical area

http://www.infectioncontroltoday.com/articles/2015/09/hand-hygiene-evs-personnel-play-key-role-in-preventing-spread-of-infection.aspx

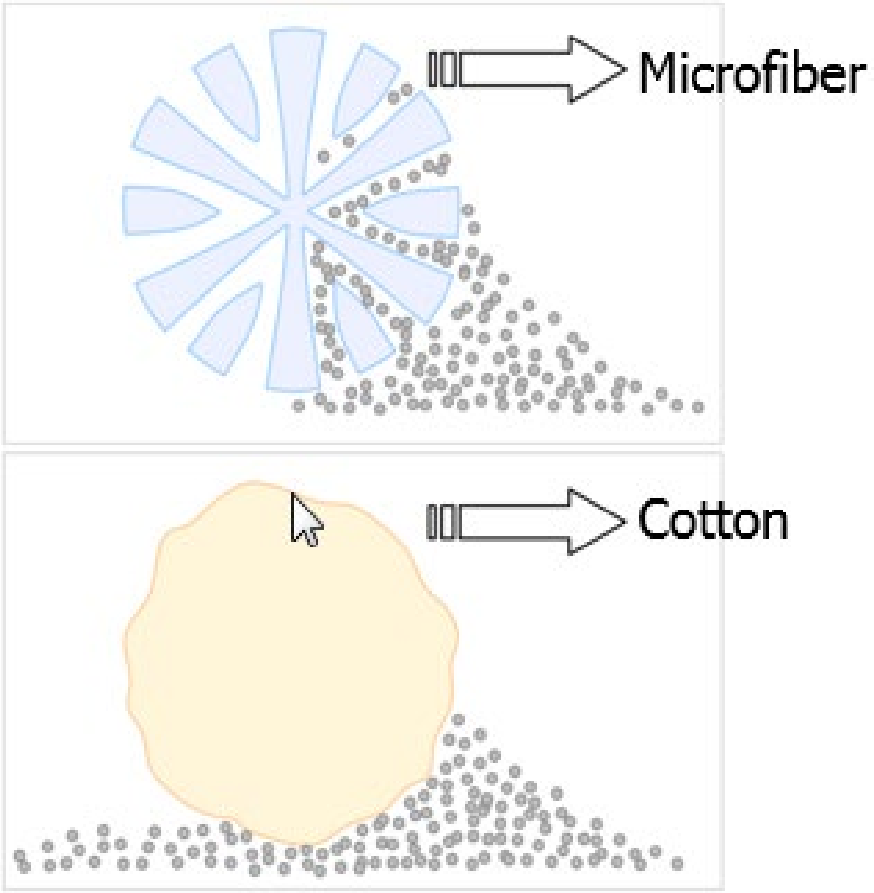
environmental_cleaning.pdf

PPE for Cleaning

- Select PPE based on:
  - Type of infection prevention precautions assigned to the patient
  - Chemicals to be used to clean the room
  - Refer to the Safety Data Sheet (SDS), directions sheet, and facility policy
- Appropriate use of PPE is critical
  - Inappropriate use may result in contamination of the HCP hands and the environment

Microfiber vs. Cotton

- Microfiber comprised of densely constructed synthetic strands
- Microfiber cleans 50% better than comparable cotton
  - Attracts dust
  - Easier to use, lighter
  - Designed for repeat usage
- UC Davis study found microfiber was initially more expensive than cotton, but cleaned better, used less water and chemicals, and decreased labor costs.



UC Davis Case Study. Nov 2002; Trajtman. AJIC. 2015;

Smith. J Hosp Infect. 2011; HICPAC/CDC 2008

Cleaning Porous Surfaces

- Fabric
  - Vacuum regularly and re-cover when worn
  - Organic material and excess liquid should be extracted as much as possible
- Carpets
  - Steam cleaning is recommended for as appropriate
  - Allow to dry for 72 hours to prevent growth of fungi
- No epidemiological evidence to show that pathogens found on fabric are linked to increased risk of HAIs

MMWR. 2003

Chou . APIC Text of Infection Control and Epidemiology. 2013

Linen

- New laundry technologies allow linen washing without requirements for hot water and chlorines
  - Hot water: 160°F x 25 minutes
  - Cold water: 71-77°F with 125ppm chlorine bleach rinse or equivalent detergent
  - Detergents not required to have stated antimicrobial claims
    - Follow manufactures instructions for use

CDC Guidelines for Environmental Infection Control in Health-Care Facilities
https://www.cdc.gov/infectioncontrol/pdf/guidelines/environmental-guidelines.pdf
Title 22, Division 5, Chapter 1, Article 8 §70825. Laundry Service
https://govt.westlaw.com/calregs/Document

Bedside Curtains

- Bacteria and fungi can survive on polyester, cotton, wool, and other fabrics
- Privacy curtains are considered high-touch surfaces and can become rapidly contaminated especially when used in transmission-based precautions isolation rooms
- Hands can become contaminated after handling curtains
  - Study found 50% of hands contaminated after handling curtains

Ohl et.al. Am J Infect Control. 2012
https://www.inspq.qc.ca/pdf/publications/1729_NoticeRecommCINQ_DividCurtainsInfectRisk.pdf
Koca et.al. Eurasian J Med. 2012

Floors and Carpets

- Non-carpeted floors
  - Disinfection of floors offers no advantage over regular detergent and water cleaning
- Carpets
  - Evidence linking carpets to HAI rates is limited; no recommendation against carpet use
  - Carpets have been shown to become contaminated
  - Vacuuming and steam cleaning temporarily reduces the number of organisms

CDC. MMWR. June 6, 2003

The Inanimate Environment, Bennett & Brachman's Hospital Infections 6th Ed. 2014

Monitoring the Thoroughness of Cleaning

How Do You Know a Patient Room is Clean?

- Appears **visually** clean or finger-swipe clean
  - Fast and inexpensive, but lacks objectivity
- Confirmed via **technology**
  - Increasingly becoming the community standard

Fluorescence

Environmentally stable marker is visible to UV light if still present after cleaning

Adenosine Triphosphate (ATP) monitoring

Measures residual organic matter left on a surface after cleaning

http://www.cdc.gov/hai/toolkits/Evaluating-Environmental-Cleaning.html

Lillis. ATP Testing: A Proven Method to Measure Cleanliness. 2015

California Department of PublicHealth

Monitoring Cleaning

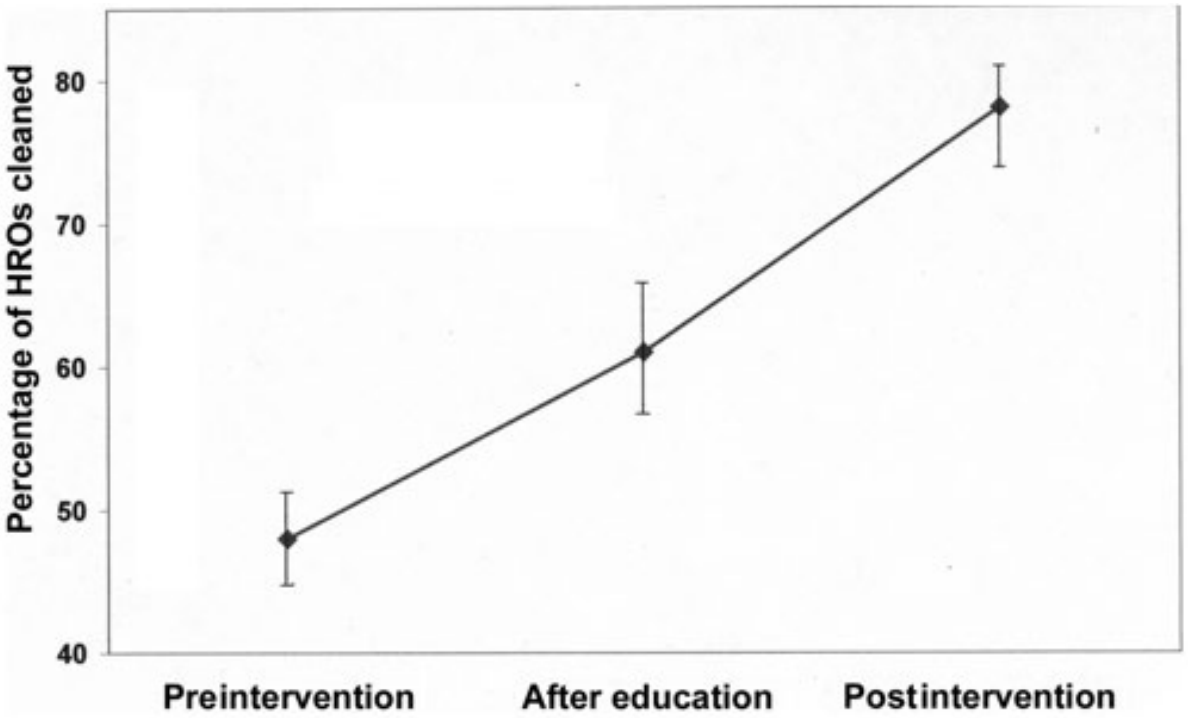
Comparison of Methods			
	Visual	**Fluorescence**	**ATP**
1. What is measured?	impression of cleanliness	whether fluorescent residual has been removed	biological matter remaining on surface after cleaning
2. Can it be used by persons of differing skill levels?	no technical training required	some technical training needed	some technical training needed
3. How objective is the method? (Can results be changed to appear more positive?)	can be subjective	objective, but marks could have been removed prior to reading	very objective
4. Can the amount of time spent on monitoring be minimized?	yes	room must be pre-marked and read after cleaning	yes

Monitoring Cleaning (continued)

Comparison of Methods			
Method	**Visual**	**Fluorescence**	**ATP**
5. How are results presented?	pass/fail	pass/fail	numeric value
6. Is software needed for the monitoring process?	no	can be used, but not required	yes
7. How well can it be used for a training tool?	results immediate with visual cues	results immediate with visual cues	results delayed, no visual cues usually available from surface
8. How affordable is the method?	no monetary investment	materials inexpensive; if formal program including staff education purchased, expenses will be higher	cost of machine and swabs is substantial

Does Monitoring Improve Cleaning?

- In 36 hospitals, mean percentage of high-risk objects cleaned was
  - 48% **prior** to intervention
  - 78% **after** intervention



Carling. ICHE. 2008

Emerging Cleaning Technologies

Whole-Room Disinfection Technologies

- Developed because adequacy of manual cleaning and disinfection is often suboptimal
  - e.g., wet contact time is not always achieved
- "Touchless" or non-manual techniques can provide a higher level of disinfection or decontamination
- Types include
  - Hydrogen peroxide fogging (dry mist or vapor)
  - Ultraviolet light (continuous emitting or pulsed xenon-UV)
- Effective in stopping CDI outbreaks

http://www.cadth.ca/sites/default/files/pdf/htis/nov-2014/RC0545%20Room%20Disinfection%20Final.pdf

Caveats to Whole-Room Disinfection Technologies

- Whole room disinfection technologies cannot substitute for
  - good physical cleaning practices
  - high level compliance to hand hygiene
  - avoidance of cross-contamination
  - staff education and competencies
- Temporary relocation of patients may be needed when disinfecting rooms
  - Need to assess cleaning procedures, chemicals used, safety issues

Caveats to Whole-Room Disinfection Technologies - continued

- Process takes time
  - Room turnover may be delayed
- Room must be thoroughly cleaned prior to technology
  - Technology is ineffective in the presence of organic matter
- Special training of cleaning staff
- Consider employee exposure (example: peroxide)
  - Special PPE may be needed

Effective Cleaning and Disinfection Programs

Cleaning Responsibility

- **All personnel are responsible** for cleaning the environment
  - Nursing services
  - Environmental services
  - Physical therapy
  - Respiratory therapy
  - Sterile processing
- Put individual responsibilities into **policy**; assign responsibilities with **checklist**
- **All personnel must be oriented** to proper cleaning methods

Holmer. AJIC, 2014

Allotted Cleaning Times

- **Proper cleaning requires adequate time**
  - **Daily** cleaning can take **20-25 minutes** per room
  - **Terminal** cleaning will take **40-45** minutes
- **Create an individualized benchmark time** for the facility based on time needed to expediently complete a checklist of items to be cleaned and disinfected
  - Input from front line staff is essential
  - Consider room size, amount of equipment, furniture and clutter that need to be cleaned or cleaned around
  - Disseminate information to all nursing units

http://www.ahe.org/ahe/learn/press_releases/2009/20090924_minimal_time_guidelines.html

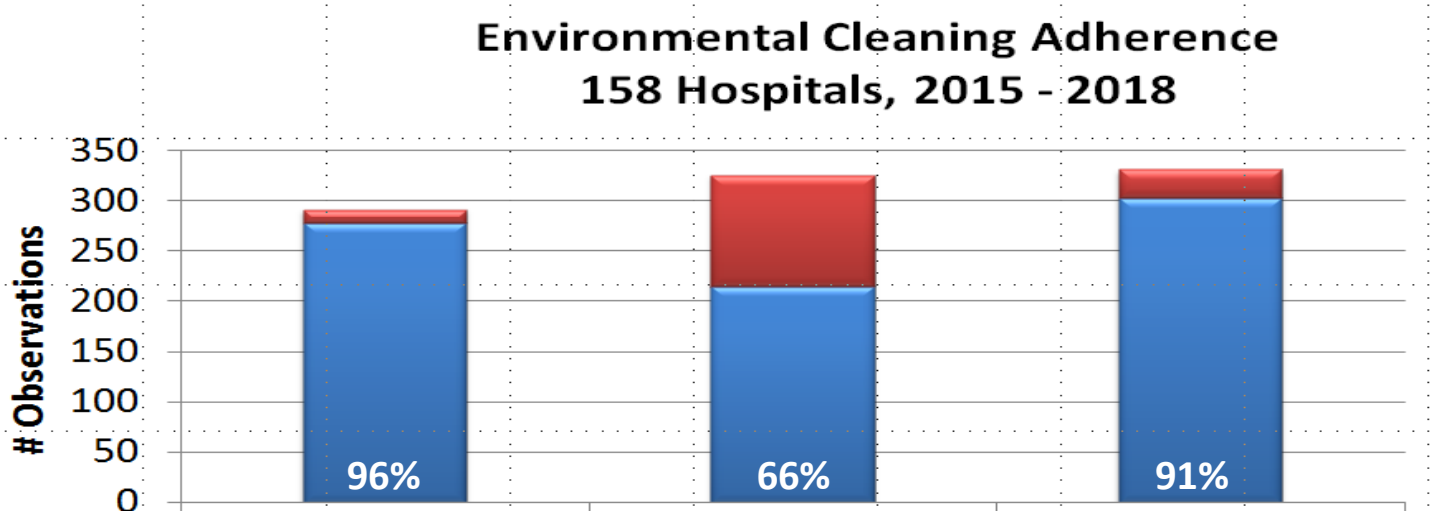
Monitor Adherence

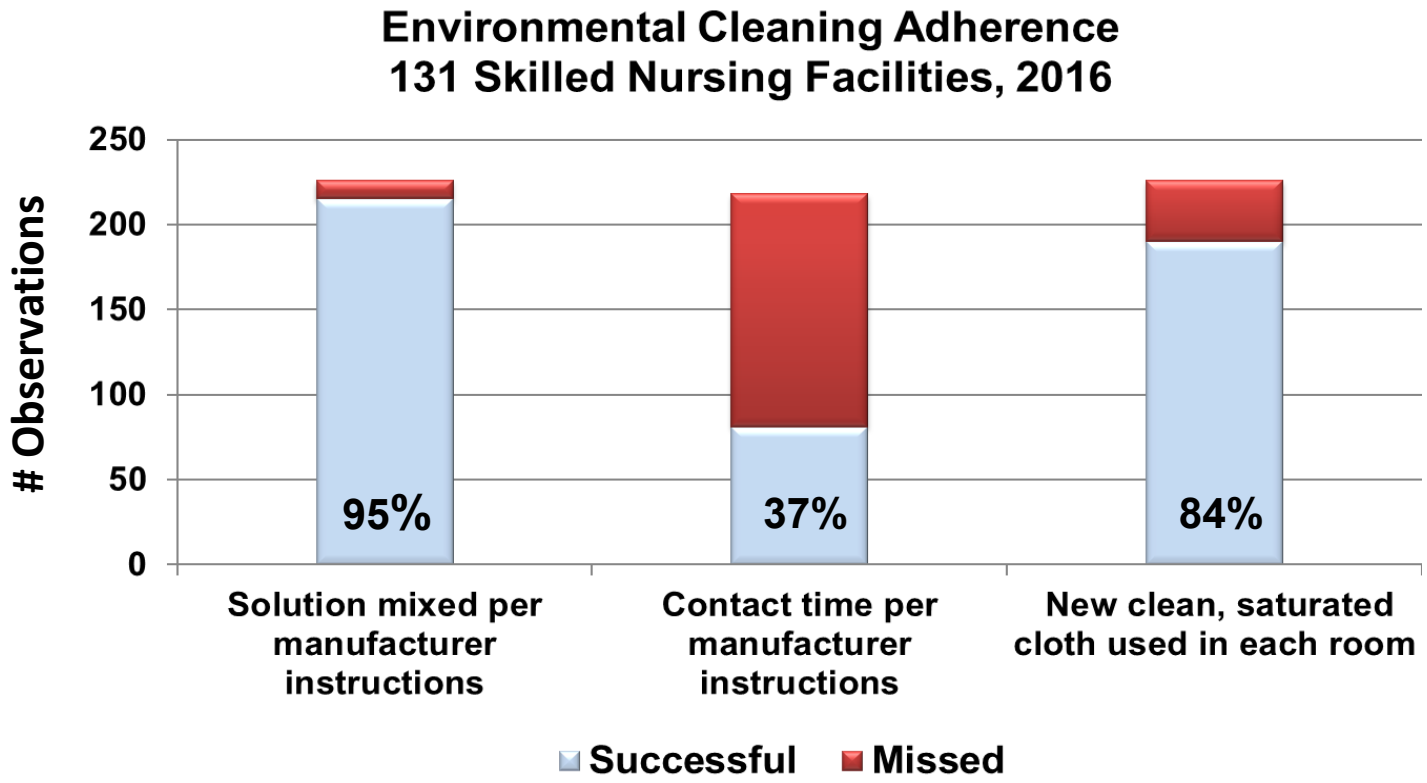
- CDPH HAI Program developed a tool to monitor adherence of cleaning practices
  http://www.cdph.ca.gov/programs/hai/Pages/AdherenceMonitoringTools.asp

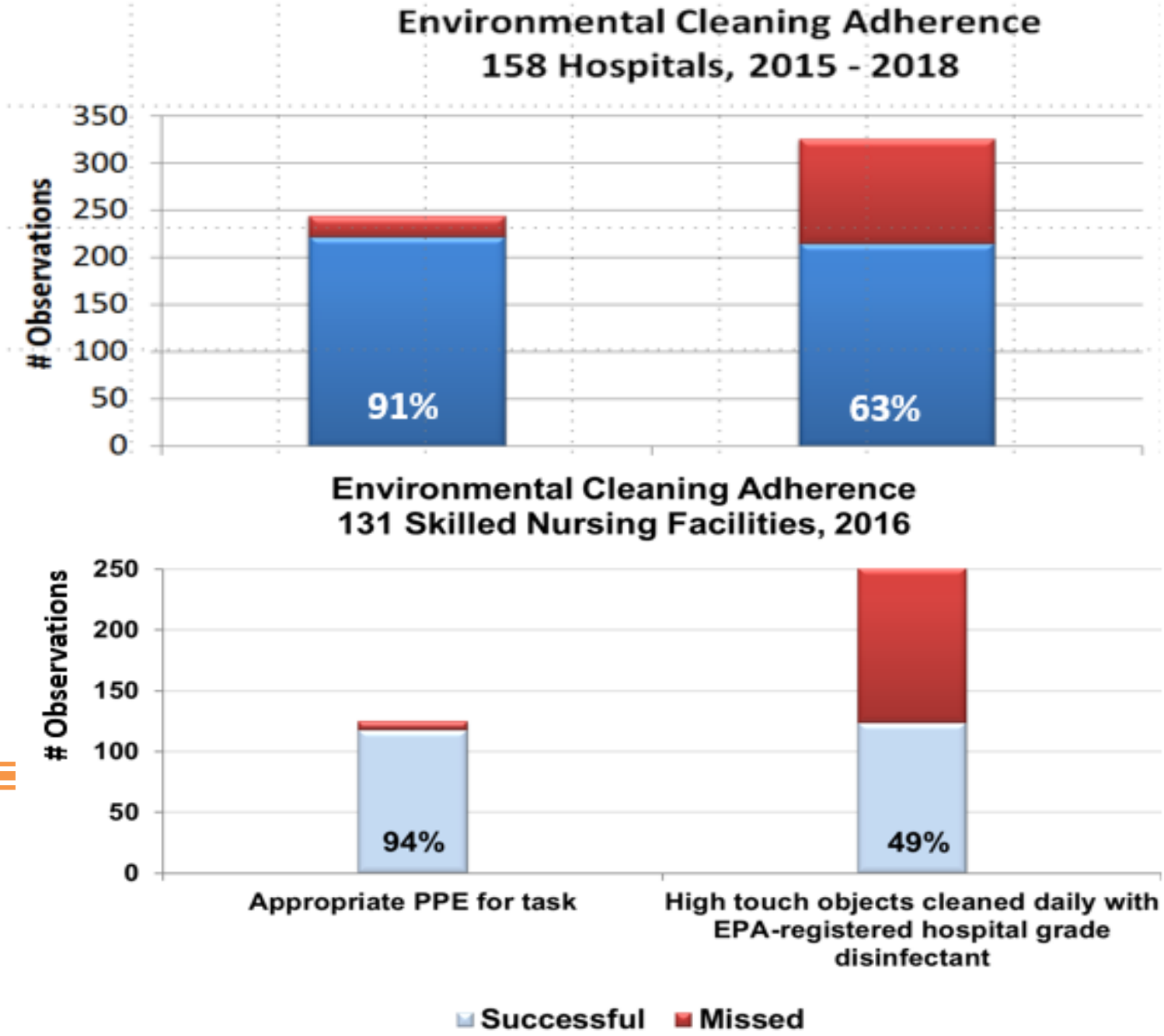
Adherence Monitoring Tool-Environmental Cleaning

Environmental Cleaning Practices	EVS Staff 1		EVS Staff 2		Adherence by Task	
					# Yes	# Obs
Detergent/disinfectant solution is mixed according to manufacturer's instructions.	Yes	No	Yes	No		
Solution remains in wet contact with surfaces according to manufacturer's instructions.	Yes	No	Yes	No		
A new clean, saturated cloth is used in each room. The cloth is also changed when visibly soiled and after cleaning the bathroom.	Yes	No	Yes	No		
Environmental Services staff use appropriate personal protective equipment (*e.g. Gowns and gloves are used for patients/residents on contact precautions upon entry to the contact precautions room.*)	Yes	No	Yes	No		
Objects and environmental surfaces in patient care areas that are touched frequently* are cleaned and then disinfected when visibly contaminated or at least daily with an EPA-registered disinfectant.	Yes	No	Yes	No		
# Yes_____ # Observed _____ #Yes/#Observed = % Adherence _____%						

CDPH Adherence Monitoring tools: (cdph.ca.gov/hai)


Environmental Cleaning Adherence
158 Hospitals, 2015 - 2018
Observations
350
300
250
200
150
100
50
0
96%
66%
91%


Environmental Cleaning Adherence
131 Skilled Nursing Facilities, 2016
Observations
250
200
150
100
50
0
95%
37%
84%
Solution mixed per manufacturer instructions
Contact time per manufacturer instructions
New clean, saturated cloth used in each room
Successful
Missed


Environmental Cleaning Adherence
158 Hospitals, 2015 - 2018
Observations
350
300
250
200
150
100
50
0
91%
63%
Environmental Cleaning Adherence
131 Skilled Nursing Facilities, 2016
Observations
250
200
150
100
50
0
94%
49%
Appropriate PPE for task
High touch objects cleaned daily with EPA-registered hospital grade disinfectant
Successful
Missed

HEALTHCARE-ASSOCIATED INFECTIONS (HAI) PROGRAM

Additional Resources: www.CDPH.ca.gov/HAI

Environmental Cleaning

Welcome to the California Department of Public Health (CDPH) Healthcare-Associated Infections (HAI) Program environmental cleaning in healthcare facilities web page. The purpose of this page is to answer questions and provide information on maintaining a clean and sanitary environment in healthcare facilities for patients, visitors and staff. Reducing bioburden in the environment decreases potential for transmission of harmful organisms. Information is presented as frequently asked questions (FAQ) with references and links to additional information. The initial content on this page will emphasize the importance of environmental cleaning for stopping the spread of *C. difficile* diarrheal infections (CDI).

Additional content will be added in the coming months. For questions, suggestions, or more information, please email HAIProgram@cdph.ca.gov.

Role of Environmental Surfaces in Disease Transmission

Effective Cleaning Strategies

Monitoring Cleaning

Reprocessing Reusable Medical Devices

Terminology

- Cleaning: removal of debris (e.g., dirt, food, blood, saliva); reduces the amount of organic matter that contributes to proliferation of bacteria and viruses
- Disinfection: removes most organisms present on surfaces that can cause infection or disease
- Sterilization: Killing or removal of all organisms

Medical Device Reprocessing Terminology

- Health care devices and equipment are designated
  - Non-critical
  - Semi-critical
  - Critical
- Categories determine level of reprocessing required

Spaulding's classification system

Cleaning Medical Instruments and Devices

- Disinfection or sterilization cannot be achieved without cleaning first
  - Organic material dilutes disinfectants
  - Bioburden must be reduced for processes to be effective
- Clean all medical instruments and devices by
  - Removing visible soil
  - Disconnecting or separating instrument parts
  - Avoiding organic material drying on equipment by rinsing or soaking in an enzymatic solution

Non-Critical Medical Devices

- In contact only with intact skin
- Require intermediate- or low-level disinfection
- Include
  - Blood pressure cuffs
  - Stethoscopes
  - Durable mobile patient equipment

Semi-Critical Medical Devices

- In contact with non-intact skin or mucous membranes
- Require **high level disinfection** or sterilization
- Include
  - Bronch**oscopes**
  - GI endo**scopes**
  - Vaginal ultrasonic probes
  - Respiratory therapy equipment
  - Anesthesia equipment

Critical Medical Devices

- Enter sterile tissue or the vascular system
- Require sterilization
- Include
  - Surgical instruments and accessories
  - Biopsy forceps
  - Cardiac and urinary catheters
  - Implants

Personal Protection for Device Reprocessing

When cleaning soiled medical instruments, wear:

- Long-sleeved impervious gowns
- Eyewear
- Mask or mask with face shield
- Gloves
- Cap
- Chemical goggles (when mixing or changing solution)

Disinfecting Medical Devices

- Disinfection eliminates or kills most bacteria, many virus types, some fungi (not prions)
- Cannot be accomplished without first cleaning
- Time-dependent process
- High, intermediate, and low levels of disinfection
- Must use EPA-approved disinfectant products
  - Product must have a tuberculocidal label claim to be used as a disinfectant for medical devices

Low-Level Disinfection

- For non-critical devices and equipment (examples: blood pressure cuffs, stethoscopes, patient care equipment)
- EPA-approved products for low-level disinfection include
  - Quaternary ammonium compounds (QUATS)
  - Phenolic compounds
  - Iodophor
- Ensure achievement of dilution and contact or “wet” time requirements

CDC Guideline for Disinfection and Sterilization, February 15, 2017

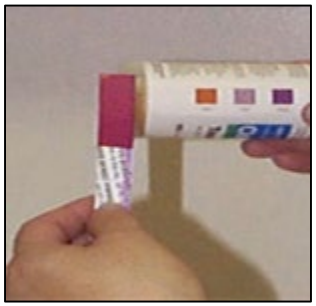
Intermediate-Level Disinfection

- For non-critical and some semi-critical devices and equipment (examples: respiratory therapy and anesthesia equipment, some endoscopes, laryngoscope blades, esophageal manometer probes)
- EPA-approved products for intermediate-level disinfection include
  - Alcohols
  - Aldehydes
  - Chlorine compounds
  - Iodophor
  - Peracetic acid
  - Hydrogen Peroxide
  - Phenolic
- Ensure achievement of dilution and contact or “wet” time requirements

https://www.cdc.gov/infectioncontrol/pdf/guidelines/disinfection-guidelines.pdf

High-Level Disinfection

- For semi-critical devices and equipment (such as scopes)
- EPA-approved products for high-level disinfection include
  - Gluteraldehyde
  - Ortho-phthaldehyde (OPA)
  - Peracetic acid
  - Hydrogen peroxide



- Ensure achievement of temperature requirements
- Test disinfectant product prior to each use
  - Change product as indicated by test, per manufacturer
  - Maintain monitoring results log
- Ensure competency of staff

CDC Guideline for Disinfection and Sterilization, February 15, 2017

Endoscopes and Bronchoscopes

- Scopes acquire high levels of contamination with use (bioburden) due to high bacteria levels in areas explored
- **Adequate reprocessing** requires
  - **Competency of personnel** performing process
  - Cleaning process
  - Minimum high-level disinfection

[1] ASGE, FDA, March 5, 2015

[2] CDC Communications 2014, 2015

Endoscopy-Associated Infections

- More healthcare-associated outbreaks are associated with endoscopes than any other medical device
  - Outbreaks often associated with disinfection process failures
- 14.4 million gastrointestinal endoscopic procedures are performed annually in the U.S.
  - Including 500,000[1] endoscopic retrograde cholangiopancreatography (ERCP)
- From 2013-2015, 69 CRE infections related to duodenoscopes
  - 13 deaths may have been partially attributable to the infection that developed after exposure to the scope[2]

[1] ASGE, FDA, March 5, 2015

[2] CDC Communications 2014, 2015

Guideline for Disinfection and Sterilization in Healthcare Facilities, 2008
https://www.cdc.gov/hai/pdfs/disinfection_nov_2008.pdf

Bronchoscopy-Associated Infections

Evidence of transmission of pathogens from inadequately processed bronchoscopes including:

- Mycobacteria resistant to many disinfectants
- Pseudomonas aeruginosa (problematic MDRO)

Guideline for Disinfection and Sterilization in Healthcare Facilities, 2008
https://www.cdc.gov/hai/pdfs/disinfection_nov_2008.pdf

Factors Leading to Outbreaks from Endoscope and Bronchoscope Contamination

- Contaminated water supply
- Contaminated brushes for cleaning scope lumens
- Improper manual cleaning prior to disinfection
- Biofilm inside automatic washer
- Improper use of automatic washer
- Contaminated or expired disinfection reagent
- Inability or neglect to clean the suction channel
- Mechanical or design issues related to the endoscope/bronchoscope

Endoscope Reprocessing

Perform all steps in order. Always follow manufacturer's instructions for use (IFU)

1. **Pre-clean**
   - Removes debris and tissue immediately following the procedure
2. **Leak Testing**
   - Detects damage to external surfaces and internal channels
3. **Manual Cleaning**
   - Includes brushing and flushing channels and ports
   - Most crucial step in the disinfection process!!!

Essential Elements of a Reprocessing Program for Flexible Endoscopes
(https://www.cdc.gov/hicpac/pdf/flexible-endoscope-reprocessing.pdf)

Endoscope Reprocessing - 2

4. **Visual Inspection – scope and accessories**
   - Provides additional assurance that scope is clean and free of defects
5. **Disinfection or Sterilization**
   - Review and follow scope manufacturer's IFU
   - Follow chemical or sterilant manufacturer's IFU
   - Follow automated reprocessor manufacturer's IFU
6. **Storage**
   - Hang vertically in a closed cabinet to promote drying and avoid recontamination
7. **Documentation**
   - Maintain documentation of adherence to these steps

Special Considerations for Reprocessing Duodenoscopes

- Duodenoscopes are used for endoscopic retrograde cholangiopancreatography (ERCP) procedures

To reprocess

- Inspect and manually clean the elevator mechanism
  - Perform in open/raised and closed/lowered positions
- Ensure that all channels of the scope and elevator mechanism are thoroughly dried before storage

Duodenoscope Surveillance Sampling & Culturing Reducing the risks of Infection
(https://www.cdc.gov/hai/organisms/cre/cre-duodenoscope-surveillance-protocol.html)
Essential Elements of a Reprocessing Program for Flexible Endoscopes
(https://www.cdc.gov/hicpac/pdf/flexible-endoscope-reprocessing.pdf)

Special Considerations for Reprocessing Duodenoscopes - continued

- Culture ERCP scopes to ensure effectiveness of reprocessing
  - See CDC suggested algorithm
  - Take remedial action if a scope is culture-positive for high concern organisms or if unacceptable colony counts of low-concern organisms

Duodenoscope Surveillance Sampling & Culturing Reducing the risks of Infection
(https://www.cdc.gov/hai/organisms/cre/cre-duodenoscope-surveillance-protocol.html)
Essential Elements of a Reprocessing Program for Flexible Endoscopes
(https://www.cdc.gov/hicpac/pdf/flexible-endoscope-reprocessing.pdf)

Sterilization

Achieved by

- Steam
- Dry Heat
- Ethylene Oxide
- Peracetic Acid
- Plasma Gas (vaporized hydrogen peroxide)
- Glutaraldehyde (using higher concentrations and exposure times than for high-level disinfection)

Steam Sterilization by Autoclave

- Most common method
- Achieves rapid heating and penetration
  - Short exposure times (<20 minutes) but temperature must be maintained throughout
  - No toxicity to workers
  - Inexpensive
  - Can damage delicate instruments
- Items to be sterilized must be:
  - Clean and free of protein or other organic material
  - Packaged so that the steam can penetrate
- Autoclave must be loaded correctly

Reprocessing Surgical Instruments

- Sterilize all surgical instruments according to published guidelines and manufacturer's recommendations
- Refer to CDC HICPAC 2008 Guideline for Disinfection and Sterilization in Healthcare Facilities for additional recommendations.

Rapid Cycle or Flash Sterilization

- Immediate-use steam sterilization should be **reserved only for** patient care **items that will be used immediately** in emergency situations when no other options are available
- **Should not** be used for reasons of convenience, as an alternative to purchasing additional instrument sets, or to save time.
- Unwrapped items only
- **Do not flash whole trays of instruments**
- Maintain records of items flash sterilized, including implants
- Requires same monitoring processes as routine steam sterilization in hospital

Monitoring Sterilization

- **Mechanical** indicators
  - Gauges, displays, printouts
  - Indicates if device working properly
- **Chemical** indicators
  - Change color with timed exposure to heat, steam
  - Show items have gone through sterilization process
  - Does not indicate sterility
- **Biological** indicators
  - Demonstrates bacterial spores on test strips or in vials/containers have all been killed
  - Indicator of sterility

Storage of Sterile Items

- Protect sterility until ready to use
  - Store to protect packages from dust, moisture, falling on floor
  - Transport only covered, dry packages
  - Handle to protect package integrity
    - Refrain from crushing packages or rubber-banding them
    - Wrap sharp points in gauze
- Rotate sterile items: first in, first out
- Store and label for effective recall system
- Expiration date versus event-related sterilization
  - Needs a program flex from L&C

Are Reusable Medical Devices and Equipment Reprocessed Appropriately in YOUR facility?

- Educated, competent reprocessing staff
- Devices properly cleaned before disinfection/sterilization
- Use of appropriate PPE
- Low, intermediate, and high-level disinfectants used according to manufacturers instructions
- Sterile packages stored appropriately

You won't know if you don't monitor!

Adherence Monitoring Tools- Device Reprocessing

HEALTHCARE-ASSOCIATED INFECTIONS (HAI) PROGRAM

Monitoring Adherence to Health Care Practices that Prevent Infection

Device Reprocessing

Many areas of the healthcare facility may be performing device reprocessing. These adherence monitoring tools may be used in any area where device reprocessing, or high-level disinfection or sterilization of reusable devices are performed. Select the monitoring tool that best applies to the reprocessing area being observed.

- Device Reprocessing Adherence Monitoring Tool (PDF)
- High-Level Disinfection of Reusable Devices Adherence Monitoring Tool (PDF)
- Sterilization of Reusable Devices Adherence Monitoring Tool (PDF)
- CDC Guideline for Disinfection and Sterilization in Healthcare Facilities (PDF)
- FDA regulations on reprocessing of single-use devices

CDPH Adherence Monitoring tools:
(www.cdph.ca.gov/hai)

Assessing Other Infection Risks in the Healthcare Environment

Environmental Assessment

- The IP performs other multidisciplinary infection prevention assessments involving:
  - Disinfectant product usage
  - Placement and proper use of sharps containers
  - Proper medical (biohazardous) waste disposal
  - Hand hygiene areas
  - Medical equipment reprocessing areas
  - Heating, ventilation and air conditioning maintenance
  - Water system maintenance
  - All construction projects

Summary

- A properly cleaned care environment is essential to prevent or contain HAIs
- A surface must be physically cleaned before it can be disinfected
- Environmental services and reprocessing staff must be competent to ensure infection prevention and patient safety
- Engage with directors of environmental services, sterile processing, operating room, endoscope services, facilities management
- Adherence to policies and procedures for cleaning, disinfection, device reprocessing, air and water management is part of a robust Infection Prevention Program
- Adherence monitoring tools available at www.cdph.ca.gov/HAI

Resources

- Environmental Protection Agency Guide to Registered Disinfectants **(Pesticide Registration)**

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

- CDC Guideline for Disinfection and Sterilization in Health Care Facilities **(Disinfectants Cleaning, Sterilization)**

(https://www.cdc.gov/infectioncontrol/pdf/guidelines/disinfection-guidelines.pdf)

- CDC Guidelines for Environmental Infection Control in Healthcare Facilities **(Water, Air, Medical Waste, Pet Therapy, Construction)**

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

- CDC Tool kit: Developing a Water Management Program to Reduce Legionella Growth and Spread in Buildings

(https://www.cdc.gov/legionella/downloads/toolkit.pdf)

- California Medical Waste Management Act

(https://cchealth.org/eh/solid-waste/pdf/medical_waste_management_act.pdf)

Questions?

For more information,
please contact any
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