Closed systems transfer devices "Reconciling recommendations and real life practice"

Pre-congress workshop: Good Compounding Practice in Oncology

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Thank you, Singapore and PSP!

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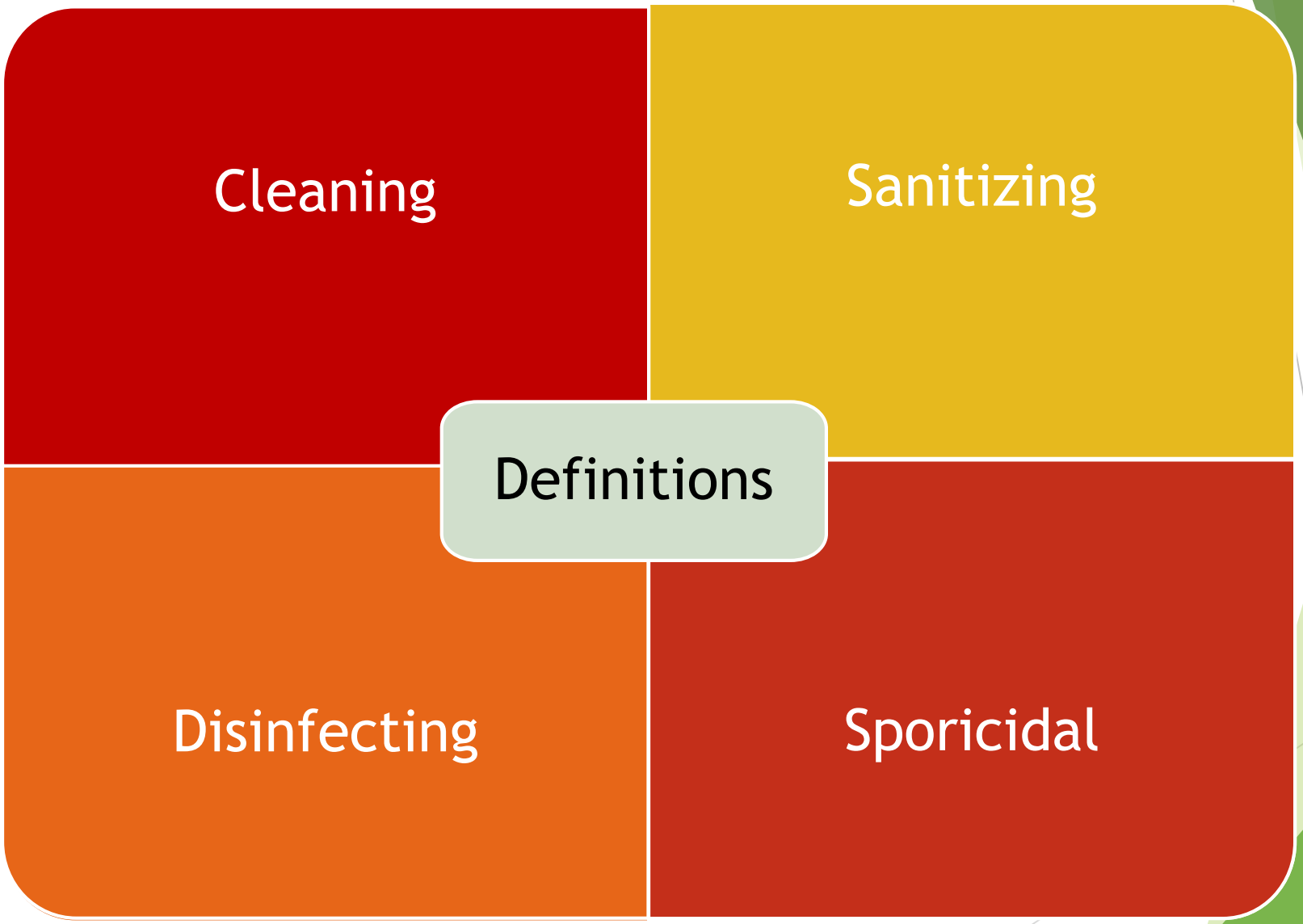
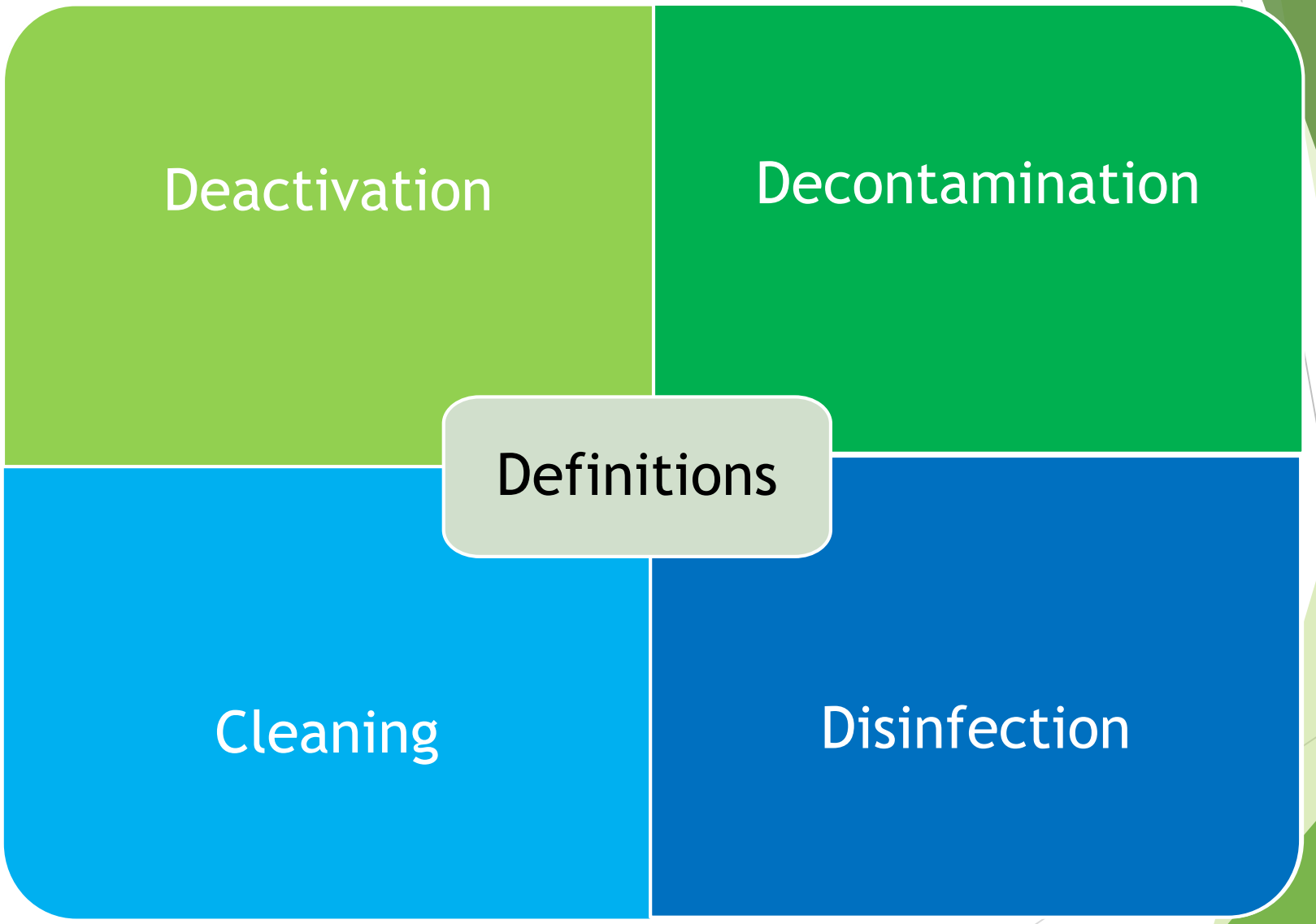
Thanks to Kate Douglass, & CriticalPoint for the use of slides/information presented in this slide deck!


Cleaning
Sanitizing
Definitions
Disinfecting
Sporicidal



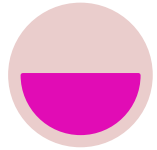
Use “Decontamination” for Deactivation/Decontamination

- No single agent can deactivate all HDs
- Since deactivation is not always possible, for the sake of keeping things simple, we use the term “decontamination”
- Decontamination is the use of physical and chemical means to render a surface or item safe for handling, use or disposal[1]
- So when the term decontamination is used in this class it means both:
  - Deactivation (if possible and practical)
  - Decontamination (transferring the agent from a non disposable surface to a disposable surface)

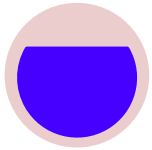
[1]Roberts S, Khammo N, McDonnell G, Sewell GJ. Studies on the decontamination of surfaces exposed to cytotoxic drugs in chemotherapy workstations. J Oncol Pharm Pract. 2006. 12:95. Retrieved on 10/3/2015 from http://opp.sagepub.com/content/12/2/95.

USP Chapter <800>: Presents 4 steps

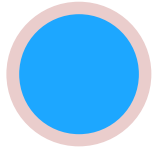
Deactivation



Decontamination



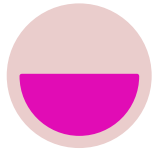
Cleaning



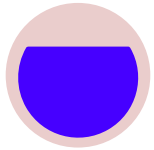
Disinfection

Source: USP Chapter <800>

An Alternative Conceptual Framework



Decontamination



Cleaning

Disinfection

Framework for Effectiveness

1. Select types of agents for decontamination, cleaning and disinfection
2. Develop specific procedures for the use of the agents
3. Train personnel who perform decontamination and cleaning
4. Monitor for compliance with SOPs and effectiveness of containment

Agents with Demonstrated Efficacy in Decontamination

- Appropriate EPA-registered oxidizing agents such as 0.5[1] to 2% sodium hypochlorite (must be mixed daily)
- Products containing 80% 10mM Sodium Lauryl Sulfate (SLS) or Sodium Dodecyl sulfate (SDS), a surfactant[1] and 20% isopropyl alcohol
- Peroxyacetic Acid and Hydrogen Peroxide
- Hydrogen Peroxide at a variety of concentrations but higher than we use for cleaning
- Dishwashing liquids[1]

[1]Lamerie TQ et al. Evaluation of Decontamination Efficacy of Cleaning Solutions on Stainless Steel and Glass Surfaces Contaminated by 10 Antineoplastic Agents. Ann. Occup. Hyg 2013. 57(4): 456-69. Retrieved on 2/26/2018 from http://forums.pharmacyonesource.com/phos/attachments/phos/pharmacy_ops/2617/1/Ann%20Occup%20Hyg-2013-Queruau%20Lamerie-456-69.pdf.

Factors in Selecting Agents

Factors in Selecting Agents

- Specific chemicals deactivate some HDs ➡ check SDS
- Most HDs are water soluble so using a cleaning agent that has surfactant allows the HD to be transferred from the target surface and moved to the wetted wipe
- Traditional tested decontamination agents are powerful oxidizers
- Some agents may act in more than one way
  - Decontamination and sporicidal agent
  - Cleaning and disinfection agent

Factors in Selecting Agents for Decontamination (continued)

- Products promoted for addressing HD decontamination should have documented effectiveness in decontaminating surfaces
- Determine if products are registered with the EPA as disinfectants
- Though neither Chapter <797> or Chapter <800> states this, cleaning agents that are ***not*** registered as ***EPA disinfecta***nts should not be:
  - considered one step cleaner/disinfectants
  - used in place of disinfectants
  - used as a decontamination, cleaning or sporicidal agent

Cleaning Agent Classes

Hydrogen Peroxide Agents

- No residues, no rinsing, not corrosive
- Effective against yeast, fungi, bacteria, virus and spores based on concentration
- Easy to store and stable

Peroxyacetic Acid & Hydrogen Peroxide Agents

- Broad-spectrum; sporicidal at low concentrations and ambient temperatures
- Inactivates gram+, gram-, fungi, yeasts, viruses and spores
- Not inactivated by organics and enhance their removal; Byproducts: oxygen, acetic acid and water

Phenolic Agents

- Many of these also EPA-registered disinfectants on environmental surfaces; not compatible with quats
- Based on dilution are fungicidal, virucidal and bactericidal
- Unpleasant odor; leave gummy residue that requires rinsing; may damage surfaces

Quaternary Ammonium Compounds

- Never sporicidal; poor activity against mycobacterium; poor activity against hydrophilic viruses
- Must be rinsed; may be irritating to eyes; not compatible with phenols
- Efficacy reduces by hard water and organic material

Kastango ES, Douglass K, Patel K, et. al., Safer Sterile Compounding: Choosing and Using Disinfectants for the Cleanroom. Int J Pharm Compd. 2015; Vol 19 No.4:268-278.

Factors in Selecting Agents: Sterile IPA

- Even though some agents used for cleaning also disinfect, only a sterile disinfectant, such as sterile 70% IPA may be used as the final step for cleaning inside of PECs
- IPA has the advantage of being able to remove residues from the products used before it
- IPA itself leaves very little residue behind
- Stronger dilutions of IPA (90%, 99%) less effective than 70%
- Caution: make sure that wiper is sufficiently wetted with alcohol but remember that dwell time does not apply to this step; dwell time applies to the cleaning step

Develop SOPs

- SOPs must be written with enough detail so that a hearing impaired person could follow them (meaning no verbal enhancement)
- Forms (whether electronic or paper) must be sufficiently detailed for reviewer to see what solutions were used, where and how

Follow Manufacturer Instructions for Use

- How to mix if not RTU
- Compatibility with:
  - Surfaces
  - Low-linting wipers used
  - Other agents

Compatible Materials:

ABS
Acrylic
Aluminum
Chrome
Computer Casings (external)
Electrical Connection Enclosures
Glass
Laminate Flooring/Counters
LCD Screens
Mattress Covers
Nickel
Paint
Polycarbonate Polyethylene
Polypropylene
Polyurethane Finishes
Porcelain
PVC
Resin Countertops
Silicone Rubber
Stainless Steel
Switch Plates (Plastic)
Tyron
Vinyl Flooring
Vinyl Rubber
Zinc

DIS018
072814

Example of compatibility information from PeridoxRTU®

Dwell Time (Contact Time)

- Time that each agent must remain wet on the surface for the agent to have its intended effect
- Some believe this isn't applicable because bioburden in controlled compounding spaces is low
- Warning: Frequent mistake is under-wetting of the low-linting wipe to apply the agent resulting in contact time not being met therefore decreased efficacy

PREempt™ RTU Disinfectant Solution and Wipe

Accel® TB RTU is being rebranded to PREempt™ RTU Disinfectant Solution and Wipes. Please see the attached change notification letter.

PREempt RTU Disinfectant Solution and Wipes work to ensure user, protocol and product compliance with fast contact times and broad-spectrum efficacy. PREempt RTU utilizes AHP®, a patented synergistic blend of commonly used, safe ingredients that when combined with low levels of hydrogen peroxide dramatically increase its potency and cleaning performance. PREempt RTU products are ideal for cleaning and disinfecting environmental surfaces in cleanrooms and laboratory areas including work stations, fume hoods, equipment and other hard non-porous environmental surfaces.

- 1 Minute Bactericidal, Virucidal
- 5 Minute Tuberculocidal
- 10 Minute Fungicidal
- 30 Seconds Broad-Spectrum Sanitizing

Wipes: Sterile vs. Nonsterile and PreSat vs Dry

Sterile vs. Non Sterile Wipes

- No requirement in the chapter for sterile wipes
- Sterile are a best practice in ISO Class 5 areas
- Low-lint, non sterile are fine for most purposes

Presaturated vs Dry Wipes

- No requirement for the use of presaturated wipes however their use within the primary engineering controls is a best practice
  - Convenience
  - Reduces variability
  - Use in HD setting

Cleaning Materials and Equipment

- Cleaning & disinfecting agents
- Mop(s) and, if necessary, bucket(s)
- Non-shedding wipes (100% synthetic preferred)
  - Pre-saturated and dry
  - 100% knit polyester or polypropylene
- Isolator cleaning tools can be used everywhere
- Equipment must be dedicated to area of use
  - Equipment used in C-PEC, C-SECs and C-SCAs must not be used elsewhere

Eye Protection

- Goggles must be available and should be worn if there is practical likelihood of splashing into eyes
- Suggest goggles ALWAYS be worn during cleaning of ceiling and walls
- Some organizations require they are worn for all cleaning activities
- If agents require dilution, always fill bucket or container with water and add agent to the water to minimize risk of splashing

Respiratory Protection

- N-95 and N-100 mask protect against particles
- Common drugs such as cyclophosphamide and fluorouracil vaporize at room temperature during normal handling
- During decontamination (if C-PEC is open), during monthly clean of tray below the deck and during spills, use of this type of respirator or PAPR should be considered
- Want particle and organic vapor filters or canisters

Keys to Proper Cleaning

- Clean from cleanest to dirtiest and top to bottom
- Use unidirectional wipes rather than circular motions
  - Slightly overlapping
  - Replace wipes or rewet mop often
- Agent dwell time is critical
- Be aware of the impact of all activities, including cleaning, on the cleanroom environment

Water? Does it matter?

- If agent is not ready-to-use (RTU), then strongly recommended Sterile water (SWInj or SWIrrig) to dilute solutions used inside of the ISO Class 5 areas.
- Though these areas and cleaning supplies are not sterile, use of sterile water reduces pyrogens and potential bioburden.

Type Water	CFU/mL*	Endotoxins*
Tap Water	500	100 EU/mL
Purified Water	100	0.25 EU/mL
Water for Injection	< 10	< 0.25 EU/mL

*Sources: USP NF defines standards for Purified water and Water for Injection; US EPA defines drinking water standards

Solutions Used in *Daily* Cleaning All Surfaces in PECs

Non Hazardous LAFW/CAI

- **Cleaning agent**
  - EPA registered one-step disinfectant cleaning agent
  - Sporicidal EPA registered one-step disinfectant clean (weekly)
- Disinfection
  - Sterile 70% IPA (sIPA) all surfaces

C-PECs: BSC/CACI

- **Deactivation/Decontamination**
  - Sodium hypochlorite (0.5% = 5000 ppm)
  - PeridoxRTU®
- Cleaning agent
  - EPA Registered One-Step Disinfectant Cleaner
  - Sporicidal EPA registered one-step disinfectant clean (weekly)
- Disinfection with sIPA
- ***Monthly:*** same under deck; best practice is weekly

Cleaning Secondary Engineering Controls

Non Hazardous SECs

- Use Cleaning agent
  - EPA Registered one-step disinfectant cleaner
  - Sporicidal EPA registered one-step disinfectant cleaner (weekly/monthly)

C-SEC or C-SCA

- Cleaning agent
  - EPA Registered one-step disinfectant cleaner
  - Sporicidal EPA registered one-step disinfectant cleaner (weekly)
- Weekly Deactivation ***and*** Decontamination *(best practice)*
  - High Touch Areas
  - Floors
  - Use deactivation agent followed by cleaning agent

Cleaning Equipment

- Store in controlled areas
- Must be rinsed and dried
- Strongly suggest the use of stainless steel or other reusable mop handles with disposable heads and mop covers
- No justification for the use of reusable, cellulose mop heads
- Any reusable equipment must be cleaned and dried before storing

What order?


6
1
10
3
8
7
2
4
9
5
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Cleaning Summary in C-SECs and C-PECs

More than Daily	Daily	Weekly	Monthly

• **Decontaminate C-PEC deck with designated agent between batches of different drugs**
• **Disinfect C-PEC deck with sterile 70% IPA**
  • Beginning of day/shift
  • Prior to each batch
  • Every 30 min
  • When visibly soiled
  • As spills occur
  • Suspect contamination
• **Sanitize carts used to stage**
• **Empty trash as needed in C-SEC or C-SCA**
	• **Empty trash in C-SEC/C-SCA**
	• **ISO Class 5 C-PEC***
	• **Easily cleanable horizontal surfaces in ante and cleanrooms** (including pass-through counter if applicable)
	• **All high touch surfaces such as telephones, intercoms, door handles, etc.**
	• **Restock daily supply cart**
	• **Floors from furthest location in C-SEC out thru anteroom** (including pass-through floor)
		• **Apply designated decontamination agent to all high touch areas and floors followed by designated cleaning agent**	• **Empty trash**
			• **Ceiling**
			• **Walls, Returns, Pass-throughs**
			• ***Every* exterior surface of the C-PECs**
			• **All carts and furniture** (top, bottom, wheels, etc.)
			• **Exterior surfaces of HD refrigerator**
			• **Supply bins**
			• **Doors, handles, exit signs**
			• **ISO Class 5 C-PEC***
			• **Restock supply cart**
			• **Floors (same as daily)**

* 3 steps to all interior surfaces: 1) Decontaminate with designated agent 2) Apply designated cleaning agent; 3) Apply sterile 70% IPA; if agents not RTU, then SW for Irrig

Writing in this color represents best practice recommendation; black indicates 797 required

CACI sleeve and gloves

- CACI sleeves and gloves must be checked and cleaned daily
- Sleeves generally last about 6 months
- Integrity of sleeves critical in negative pressure applications; change before cleaning
- Recommend using sterile gloves tested to ASTM 6978-05
- Positive pressure gloves can be changed at any time; Negative pressure gloves are best changed at the beginning of daily cleaning (to ensure that if they let in non ISO classified air during glove change, that isolator still cleaned)
- ALWAYS don sterile gloves inside the isolator…they are placed on top of the isolator gloves; sterile gloves must be used when compounding!

To Open or Not to Open?

- Acceptable to open C-PECs (BSC and CACI) for daily cleaning as long as:
  - Compounding has not occurred for 5 minutes
  - C-PEC remains running
  - Personnel cleaning are fully garbed
  - Additionally wear PAPR or NIOSH-approved, fit-tested, full-face, dual-chamber with multi-gas/P100 canisters respirator at least through the decontamination phase
- Close C-PEC for application of sterile 70% IPA
- Must at least open C-PEC monthly to perform a decontamination, clean and disinfection to the area below the deck and in the event of a spill

Staff Training

- Only authorized pharmacy personnel may clean inside any PEC
- If your pharmacy outsources daily or monthly cleaning to environmental services or an outside agency, these persons must successfully complete:
  - Training program
  - Hand Hygiene and Garbing Competency for Hazardous Drug Environments
  - HD Cleaning Competency
- Note: The initial Gloved Fingertip Sampling (required 3x in association with the Hand Hygiene and Garbing Competency) is not required of outsourced cleaning personnel since they must be trained NEVER to put their hands inside ISO Class 5 spaces

Monitoring for Compliance through Wipe Sampling

- Review completed documentation forms for completeness
- Visually observe staff during compounding and cleaning duties to verify compliance
- Recommend performing some HD wipe sampling in some areas of the pharmacy
  - at least high touch areas in C-SEC and C-SCA
  - floors in C-SEC, anteroom and C-SCA
  - floor immediately outside of the C-SCA or anteroom
- Perform these measurements as a baseline, after program changes and periodically to assess for continued containment

Summary

- In addition to performing daily cleaning and disinfection to controlled environments where HDs are compounded, staff must be focused on decontamination and containment strategies as well
- Staff must receive training in:
  - HD Hand Hygiene and Garbing (donning and doffing)
  - Decontamination, Cleaning and Disinfection Procedures
- Clear and detailed policies must be written with associated documentation
- It is strongly suggested that HD Environmental Sampling is performed before and after procedures are changed to assess their effectiveness

Selected References

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