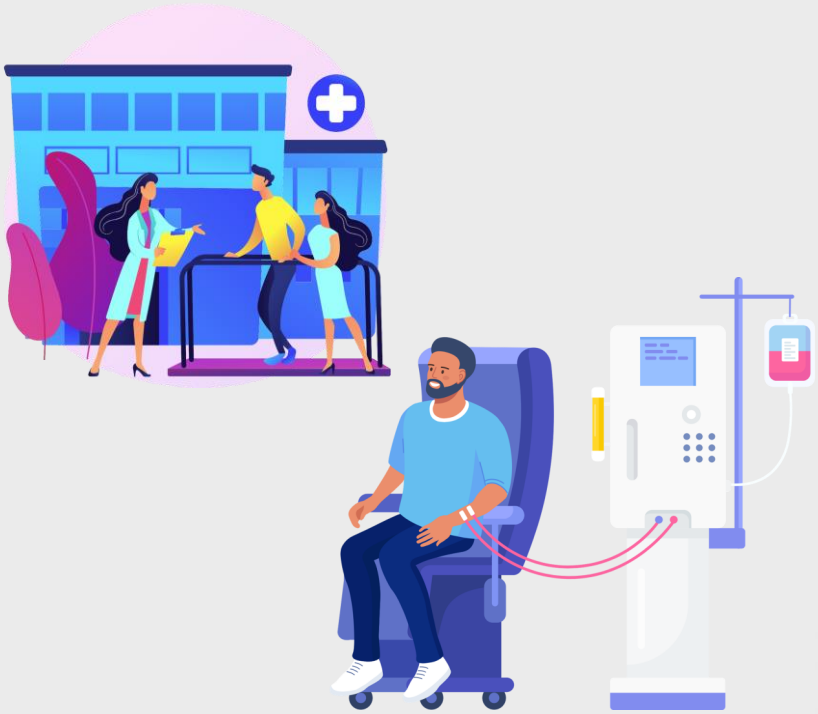


ENVIRONMENTAL CLEANING & DISINFECTION IN REHAB & DIALYSIS:

Key Considerations for Infection Prevention

Vydia Nankoosingh MLT, CIC
APIC Indiana
May 9, 2025

Disclosure

Vydia is employed by Diversey—A Solenis Company. Her expenses to attend this presentation (travel, accommodation, and salary) are paid by this company. Diversey has had no input into this presentation from a commercial interest.

TODAY'S OBJECTIVES

1

CHARACTERISTICS

Review Drs. Rutala & Weber's key considerations for selecting healthcare disinfectants

2

COMPLIANCE

Describe regulatory elements of disinfectants, including manufacturer's instructions for use (MIFU)

3

PROCEDURES

Provide facility-wide solutions to gaps in environmental cleaning & disinfection

4

DIALYSIS & REHAB ENVIRONMENTAL C&D

State challenges to dialysis & rehab environmental cleaning & disinfection

SEMINAL PUBLICATION:

HOW DO WE SELECT THE RIGHT DISINFECTANT?

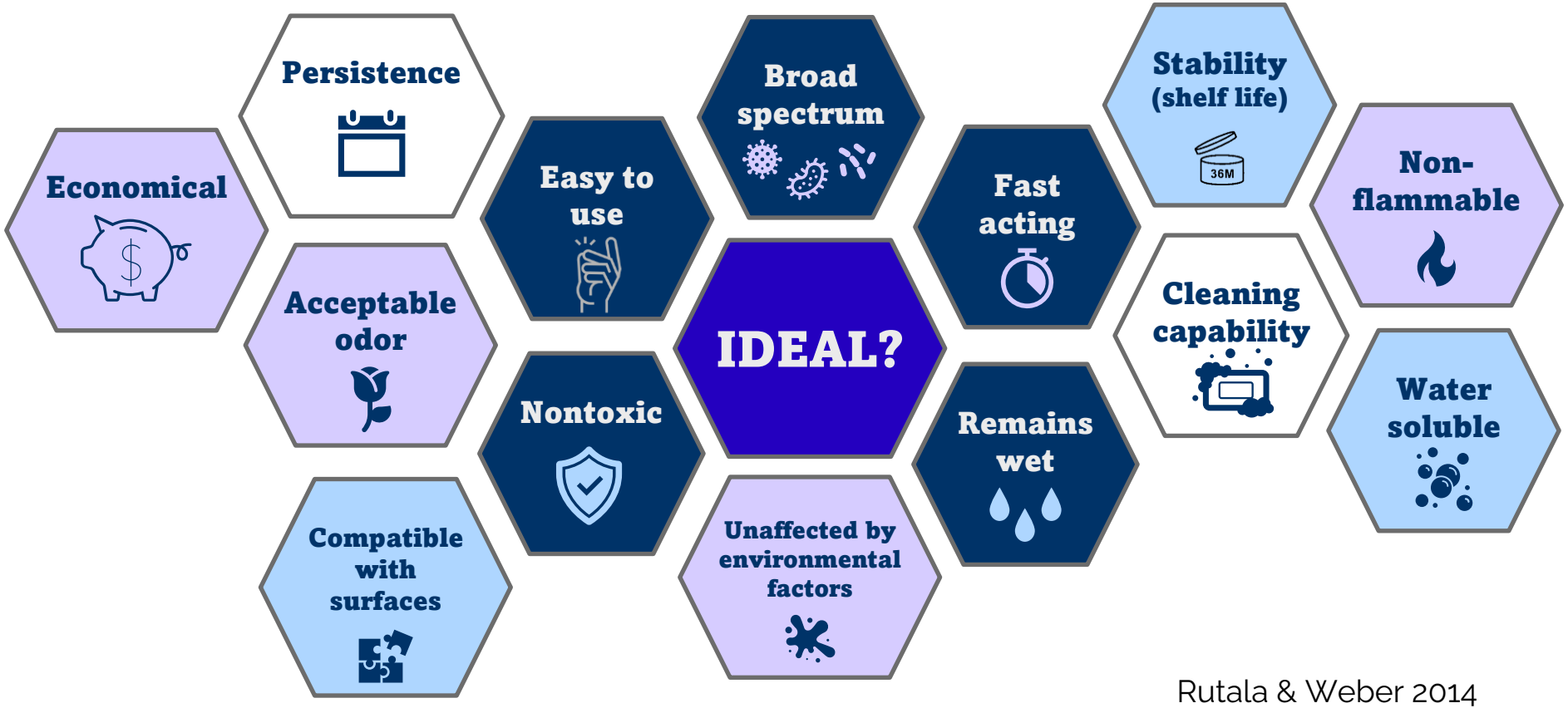
INFECTION CONTROL AND HOSPITAL EPIDEMIOLOGY JULY 2014, VOL. 35, NO. 7

COMMENTARY

Selection of the Ideal Disinfectant

William A. Rutala, PhD, MPH;[1] David J. Weber, MD, MPH[1]

CRITERIA OF THE IDEAL DISINFECTANT



Rutala & Weber 2014

Before choosing disinfectants, consider who is using what disinfectant, where & when.

PRIMARY DISINFECTION RESPONSIBILITIES IN ACUTE CARE FACILITIES

Device User/ Clinical

- Determined by facility policy
- Shared portable medical equipment

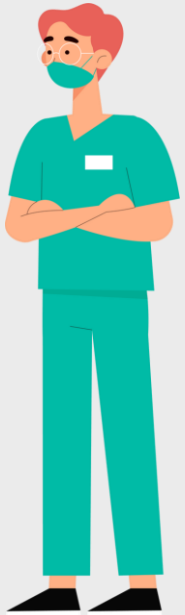
Environmental Services

- High-touch surfaces
- Occupied daily room cleaning
- Discharges
- General shared areas
- Generally *not* responsible for shared portable medical equipment

Central/ Sterile Supply

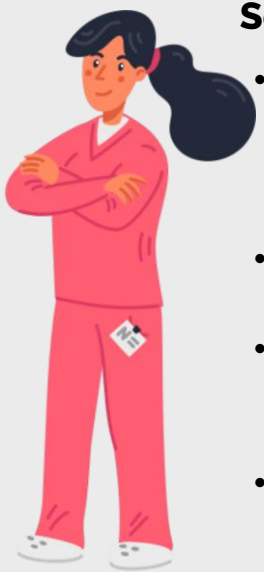
- Unique/ complex equipment reprocessing (e.g., IV pumps)

PRIMARY DISINFECTION RESPONSIBILITIES IN REHAB & DIALYSIS FACILITIES



Dialysis technicians

- Specialized training in dialysis-specific protocols (machine interiors, etc)
- May be employed by the facility or outside/ contracted company.
- Very helpful in learning dialysis complexities!



Environmental Services

- Responsibilities may be unique from acute care facilities.
- Contracted versus facility employed
- May need specialized training in dialysis areas.
- If contracted, what disinfectants are used?

Rehab Therapists & Assistants

- Responsible for in-between therapy disinfection.
- Can assist in rehab planning for contact isolation patients & residents.
- Typically, highly involved in care plans.

BUT FIRST:
CLEANING!

CLEANING BASICS

- Items must be **cleaned** using water with detergents or enzymatic cleaners **before processing**.
    - Especially important in areas where visible contamination is likely (e.g., OR, dialysis)
- Cleaning reduces the bioburden and removes foreign material (organic residue and inorganic salts) that interferes with the disinfection/sterilization process.
- Cleaning or decontamination should be done as soon as possible after the items have been used as soiled materials become dried onto the instruments.

Key Considerations for Selecting YOUR Ideal Disinfectant!

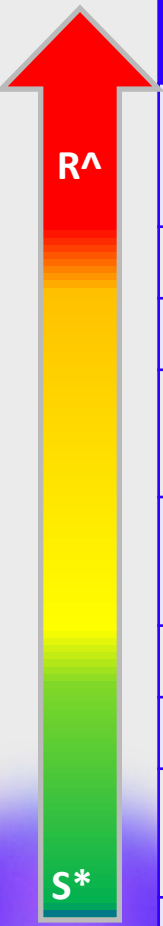
CRITERIA OF AN IDEAL DISINFECTANT: KEY CONSIDERATIONS

CONSIDERATION	QUESTIONS TO ASK
Kill Claims	Does the product kill the most prevalent healthcare pathogens?
Kill Times and Wet Contact Time	How quickly does the product kill prevalent healthcare pathogens? Ideally, contact time greater than or equal to the kill claim.
Safety	Does the product have an acceptable toxicity & flammability rating?
Ease of Use	Odor acceptable, shelf-life, in convenient forms (wipes, spray) water soluble, works in organic matter, one-step (cleans/disinfects)
Other Factors	Supplier offers comprehensive training/education, 24-7 customer support, overall cost acceptable (product capabilities, cost per compliant use, help standardize disinfectant in facility/system)

Rutala & Weber 2014

KILL CLAIMS

- Does the product kill the most prevalent healthcare pathogens, including those that:
  - Cause most HAIs?
  - Cause most outbreaks?
  - Are of concern with your team?
    - Use your **annual risk assessment & plan**!
    - Consider unit/department specific needs



Organism	Type	Examples
Bacterial Spores	Spore	Bacillus anthracis, Clostridioides difficile
Mycobacteria	Bacteria	M. tuberculosis
Small non-enveloped virus	Virus	Poliovirus, Norovirus, Hep A
Fungal spores	Fungus	Aspergillus, Penicillium, Trichophyton
Gram negative bacteria	Bacteria	E. coli, Klebsiella including **CRE**, Pseudomonas, Acinetobacter
Fungi (Vegetative)	Fungus	Candida
Large Virus (non-enveloped)	Virus	Adenovirus, Rotavirus
Gram positive bacteria	Bacteria	Staphylococcus including **MRSA** Enterococcus including **VRE**
Virus (enveloped)	Virus	HIV, HBV, HCV, Influenza, **Mpox**

^Resistant
** Sensitive*

Adapted from Rutala et al. ICHE 2014;35(7):862

Antimicrobial resistance ≠ Disinfectant resistance

CLAIM GAME


Hardest to Kill
(least susceptible)
Spores
(Clostridioides difficile)
Protozoa & Cysts
(Giardia, Cryptosporidium)
Mycobacteria
(M. tuberculosis)
Non-Enveloped Viruses
(Calicivirus, Rhinovirus, Adenovirus)
Fungi
(Aspergillus, Candida, Trichophyton)
Vegetative Bacteria
(E. coli, Salmonella, Staphylococcus, Pseudomonas)
Enveloped Viruses
(Coronavirus, Influenza, Hepatitis B & C, HIV)
20 or more of the EASIEST to kill pathogens does not make a product more effective.
Easiest to Kill
(most susceptible

CRITERIA OF AN IDEAL DISINFECTANT: KEY CONSIDERATIONS

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Rutala 2014

KILL TIMES & WET/CONTACT TIME

Kill times may vary by pathogen on a product label.

Most IP departments will adhere to the highest wet/contact time of all relevant pathogen kill times listed.

Some disinfectants may have higher kill times for bloodborne pathogens, which should always be adhered to in healthcare environments.

ALL HCP must know the agreed upon contact times for all disinfectants!

Regulatory & accreditation surveyors ARE TIMING disinfection!

CRITERIA OF AN IDEAL DISINFECTANT: KEY CONSIDERATIONS

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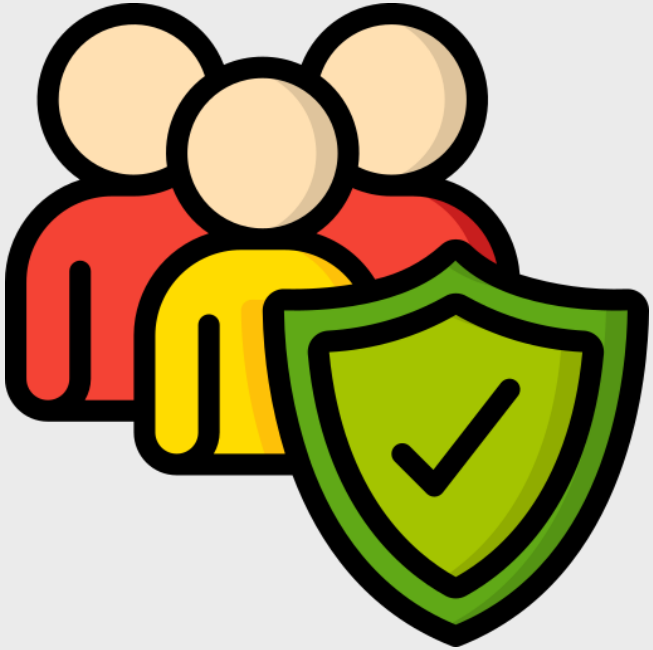
Rutala 2014

PRODUCT SAFETY

Best is HMIS 0/0/0 or EPA Toxicity Rating of IV

- No warning or caution language on the label!
- Not harmful to health, not flammable, no physical hazard
- No gloves or other PPE (important for **patients, residents, family & visitors**)
- Staff will use gloves as per Standard Precautions



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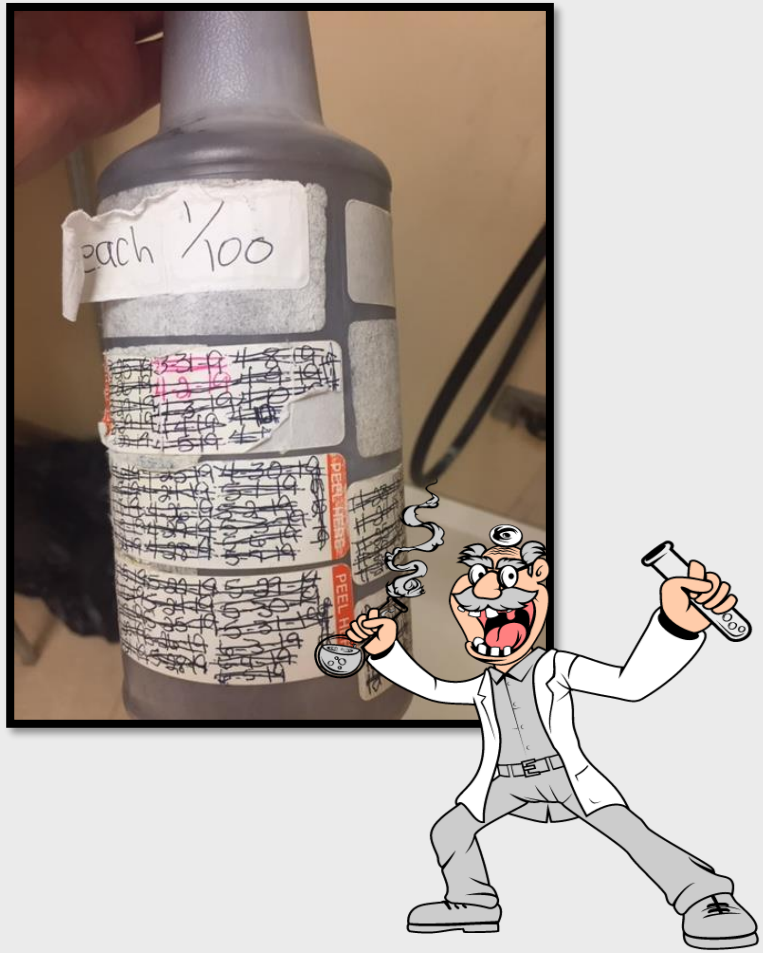
Rutala 2014

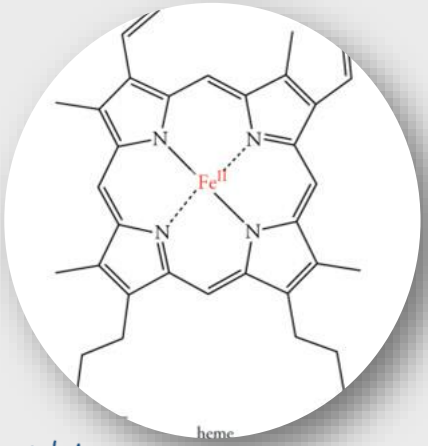
EASE OF USE

- Acceptable odor
- Shelf life
- Convenience
  - Ready-to-use, liquids, sprays, refills & multiple wipe sizes, etc.
  - **Be aware of manual mixing in dialysis!**



QUAT BINDING

- Some cleaning tool fabrics, such as cotton and microfiber, are known to bind with quaternary ammonium compounds (“quats”). *This is known as “quat binding”*
  - Active ingredients (quat) have a tendency to become attracted to, and absorbed into, microfiber and cotton fabrics
  - Cotton fabrics and most microfibers are negatively charged or anionic
  - Quats are positively charged, or cationic, and are attracted to the negatively charged fabric surfaces
  - **IMPORTANT: If the quat is applied to the surface for the contact time, binding is avoided.**



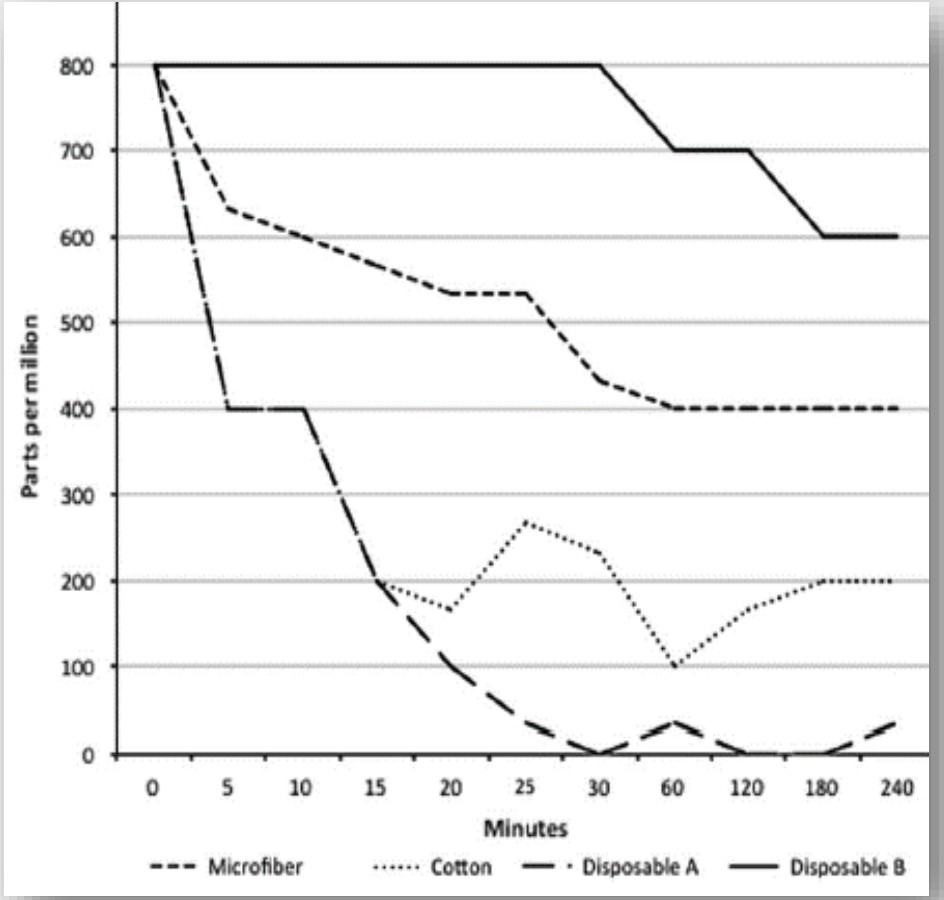
Quat binding risks generally do not apply to prewetted, ready-to-use disinfectant wipes.

Image: https://www.sciencedirect.com/topics/chemistry/quaternary-structure

QUAT BINDING

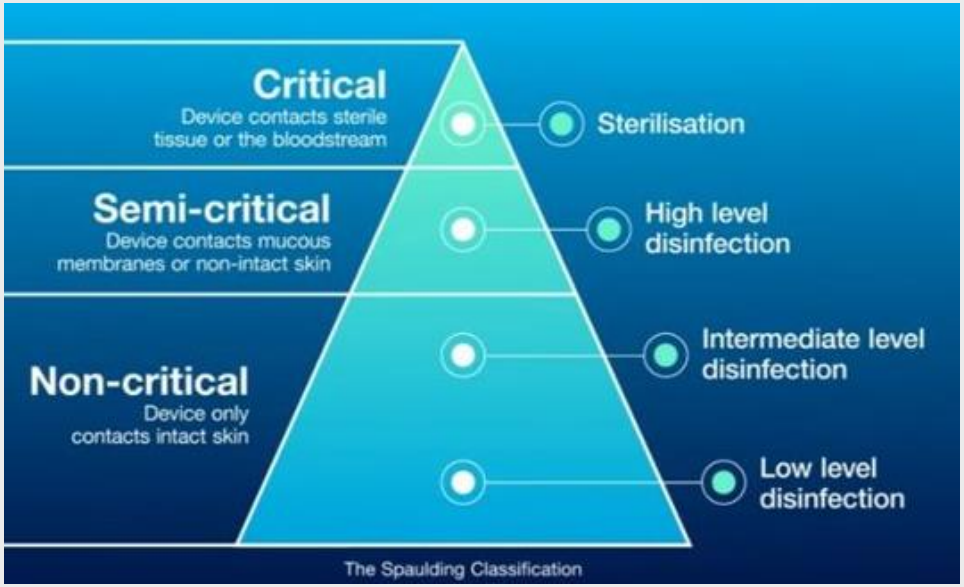
Microfiber wipers, cotton towels, and 1 of 2 types of disposable wipes soaked in a Quat disinfectant revealed significant binding of the disinfectant.

Boyce 2016



KEY REGULATORY CONCERNS

MANUFACTURERS' IFUs



Manufacturer's instructions for use

- Equipment = FDA
- Disinfectant = EPA
- Notably, IFUs & labels (disinfectants) are **the Law**
  - ***Unless*** Spaulding criteria not met & risk to patient is identified

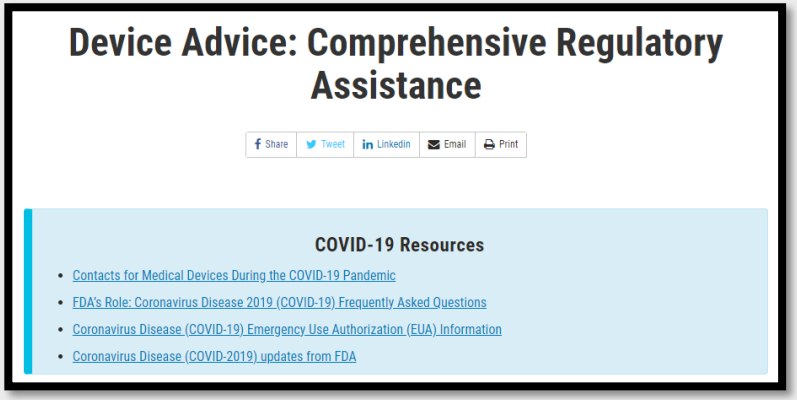
MANUFACTURERS' IFUs

- Contentious for **disinfectant suppliers**
  - Newer/improved disinfectants are not included in MIFUs
- Contentious issue for **equipment manufacturers**
  - May have found one disinfectant that works
  - May not have tested a true disinfectant (soap & water, isopropyl alcohol)
- MOST contentious for **INFECTION PREVENTIONISTS!**
  - IPs are caught in the middle, spending hours looking for answers.

Example of a portable hemodialysis machine. Some machine IFUs do not allow high alcohols or bleach.

MANUFACTURER'S IFUs

- Check if your disinfectant supplier has a **compatibility specialist/expert** that works with instrument components or provides our solutions to manufacturers!
- FDA expects you to communicate with device manufacturer *first*
- If solution cannot be reached, use FDA's DICE to communicate IFU issues



https://www.fda.gov/medical-devices/device-advice-comprehensive-regulatory-assistance/contact-us-division-industry-and-consumer-education-dice

PROCEDURES

ROLES & RESPONSIBILITIES

CLEARLY DEFINE . . .

- WHAT?
- WHO?
- WHEN?
- WHERE?
- HOW?

CLEANING RESPONSIBILITY	ITEM	APPROVED DISINFECTANT	FREQUENCY
C.N.A.	Blood pressure machine	Wipe A	Between patient use
	Feeding pumps	Wipe A	Weekly, PRN & at discharge
	Handheld thermometers	Wipe A	Between patient use
	Shower gurney	Wipe A	Between patient use
	Warming blanket machine	Wipe A	Between patient use
	Shower chairs	Wipe A	Between patient use
EVS	Beds: handrails	Wipe A	Daily with room cleaning
	Beds: horizontal surfaces	Wipe A	Discharge
	Bedside cabinets	Wipe A	Daily with room cleaning
	Call bell/remote	Wipe A	Daily with room cleaning
	Commode	Wipe A	Daily with room cleaning
	Computer keyboards at Nursing station	Wipe A	Daily
	Privacy curtains	Wipe A	Every 30 days, PRN, and at discharge
	Wheelchairs	Wipe A	Every 30 days & PRN
HIM	Medical record chart	Wipe A	Daily
Lic. Nurse	Bladder scanner	Wipe C	Between patient use
	Glucose meter	Wipe B	Between patient use
	IV pumps while in use and after d/c	Wipe A	Weekly, PRN & at discharge
	Med Carts	Wipe A	Daily and PRN
	PCA pumps	Wipe A	Discharge
Rehab	Rehab equipment	Wipe A	Between patient use
RNA	Hoyer lift	Wipe A	Between patient use
	Scales, patient	Wipe A	Between patient use
RT	Cough assist machine	Product X	Between patient use
	IPV	Wipe A	Between patient use
	i-Stat	Wipe A	Between patient use
	Pulse Oximeters	Wipe A	Between patient use
	Space Lab	Wipe C	Weekly, PRN & at discharge
	Ventilators	Wipe C	Weekly, PRN & at discharge
	Vest machine	Wipe C	Between patient use
	Welch Allyn	Wipe C	Weekly, PRN & at discharge

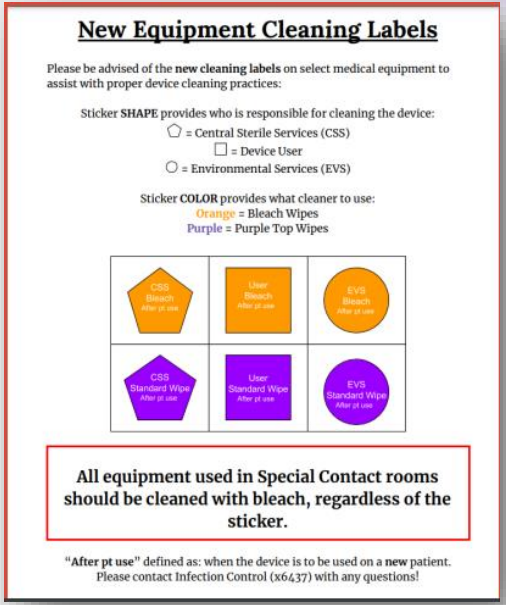
https://community.apic.org/viewdocument/cleaning-monitoring-and-medical-equipment-cleaning-responsibilities?CommunityKey=a42080cc-43bc-4706-beba-216aa38f9940&tab=librarydocuments

APIC 2022 Noncritical Disinfection Presentation

#APIC2022

Selected Equipment for Labeling

Equipment or Item	Group Responsible	Manufacturer Recommended
IV pump	CSS	Bleach
SCD Pump	EVS	Bleach
Vital Sign Machines	User	Bleach
Wall Mounted Vital Sign Machines	EVS	Bleach
EKG Machine	User	Bleach
PCA	CSS	Bleach
Feeding Pump	EVS	Bleach
Defibrillator on Code Cart	CSS	Quaternary Ammonium
Wall Mounted Patient Monitor/Leads/Pulse Ox/Cuff	EVS	Quaternary Ammonium
Bladder Scanner	User	Quaternary Ammonium
Telemetry Pack	User	Quaternary Ammonium



Dabkowski M. 2022. **Improving Cleaning Compliance of Noncritical Equipment with Labels and Auditing**. APIC 2022 oral abstract. Accessed securely online as conference attendee at https://c53ac34983397363b9e2-fa85729df59db74d0fed9dc21ffea231.ssl.cf1.rackcdn.com//1884872-1491675-004.pdf.

POINT OF CARE DISINFECTION

- It is everyone's job to disinfect, but it is *not* everyone's job to disinfect everything, every time!
- If, during care, you touched it or used it: Disinfect it!
- **Training cards/checklists for ALL who do the cleaning/disinfection.**
    - Bring the IFUs & product to the equipment!

MUST BE AVAILABLE AT POINT OF CARE!

REMEMBER:

If it's something used on more than one patient, multiple times a day, EVS cannot be solely responsible for disinfecting it.

ENVIRONMENTAL CLEANING & DISINFECTION IN REHABILITATION

"The ultimate goal of rehab is to **mitigate** the disease process, **restore** function, **reestablish** self-care, and to **prepare** the patient for **reentry** and **reintegration** into community."

—APIC Text Online

REHABILITATION SERVICES

According to the WHO:

- Globally, an estimated 2.4 billion people are currently living with a health condition that may benefit from rehabilitation
- The need for rehabilitation worldwide is predicted to increase due to changes in the health and characteristics of the population- people are living longer, but with more chronic disease and disability

https://www.who.int/news-room/fact-sheets/detail/rehabilitation

TYPES OF REHABILITATION FACILITIES

- **Inpatient Rehab facility-** freestanding rehab hospital or a rehab unit in an acute care hospital
- **LTC Rehab-** A residential facility that cares for individuals who need continued assistance with ADLs or medical management of their care plans
- **Rehabilitation Services- Inpatient or outpatient services** such as:
    - physical therapy
    - occupational therapy
    - speech-language pathology
    - psychiatric rehabilitation
    - often follows acute care for injury, disability, illness, or another cause of dysfunction

APIC Text accessed April 2025

KEY CONCEPTS

- **HIGH-TOUCH, HIGHLY INTERACTIVE**
- High number of facility transfers= bigger pool of endemic pathogens, including **MDROs**
- Patients interacting with many HCWs and HCWs interacting with many patients= increased chance for cross contamination and infection transmission
- No specific rehab IP **standards- recommended to use standards designed for LTC**
- Comorbidities/lower ADLs = higher risk for **HAIs**
- **Patient-centered** framework (highly individualized)

APIC Text accessed April 2025

Contamination of Common Area and Rehabilitation Gym Environment with Multidrug-Resistant Organisms

Objectives:
To quantify the multidrug-resistant organism (MDRO) burden of high-touch common area and rehabilitation gym surfaces in 6 nursing homes

- Rehabilitation gyms: 521 equipment samples over 60 visits. Checked surfaces for MRSA, VRE & GNB.

- 33/60 (55.0%) rehab gym sampling visits demonstrated the presence of at least one MDRO-positive specimen
  - Of the 521 rehabilitation equipment specimens collected:
    - 40 (7.7%) were positive for at least one MDRO
    - 13 (2.5%) with MRSA
    - 21 (4.0%) with VRE
    - 10 (1.9%) with R-GNB

Gontjes, J Am Geriatr Soc, 2020

MDRO CONTAMINATION: REHAB SURFACES

Stairs

10%

Mat

8%

Pulley

12%

Arm Bike

17%

Most contaminated

Activity Table

7%

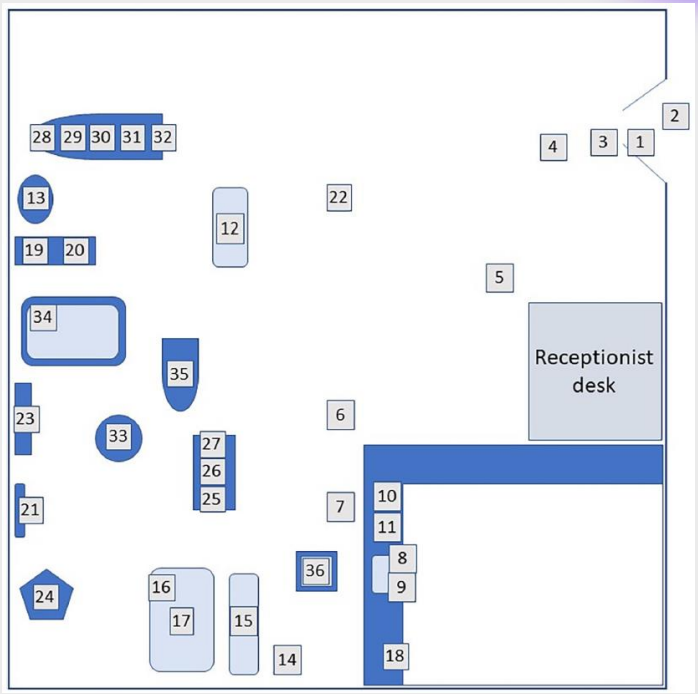
Gontjes, J Am Geriatr Soc, 2020

The microbiome of an outpatient rehabilitation clinic and predictors of contamination: A pilot study

Objective:

Observational pilot study to characterize the microbiome of an outpatient REHAB clinic and examine relationships between clinic factors and contamination

- Forty commonly contacted surfaces in an outpatient REHAB clinic were observed for frequency of contact, swiped using environmental sample collection kits and tested for bacterial and fungal DNA
- Surfaces were categorized based on frequency of contact and cleaning and surface type



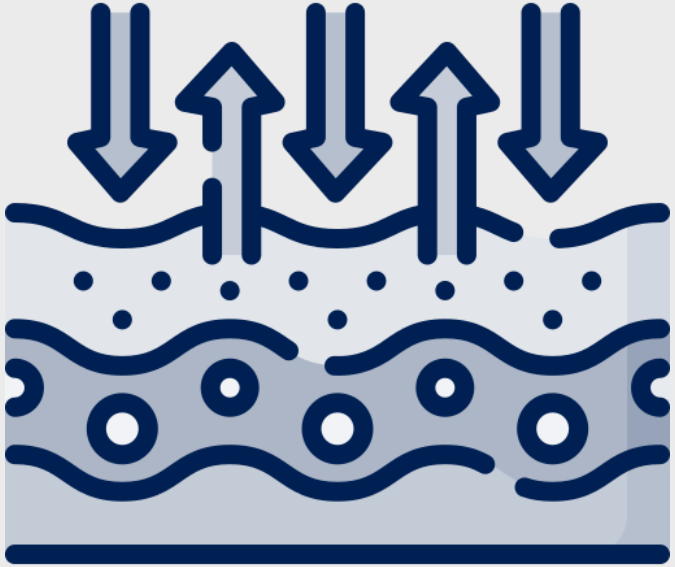
Brigando, PLoS One, 2023

The microbiome of an outpatient rehabilitation clinic and predictors of contamination: A pilot study

- Highest total bacterial contamination DID NOT correlate with most contacted surfaces

- **Contamination mostly correlated to:**
  - **Surface type (porous vs non-porous**
  - **How the surface is contacted (hand vs foot contact)**

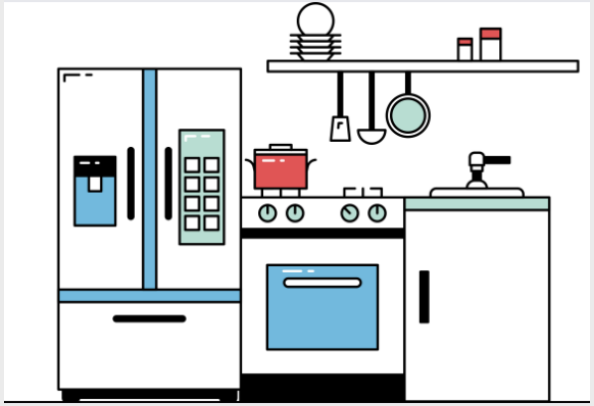
- Non-porous surfaces more resistant to contamination
- Porous surfaces harbor more and potentially different and problematic microbes such as Staphylococcus aureus compared to non-porous surfaces
- Different microbes were identified in hand vs foot contact surfaces



Brigando, PLoS One, 2023

SIMULATION ENVIRONMENTS

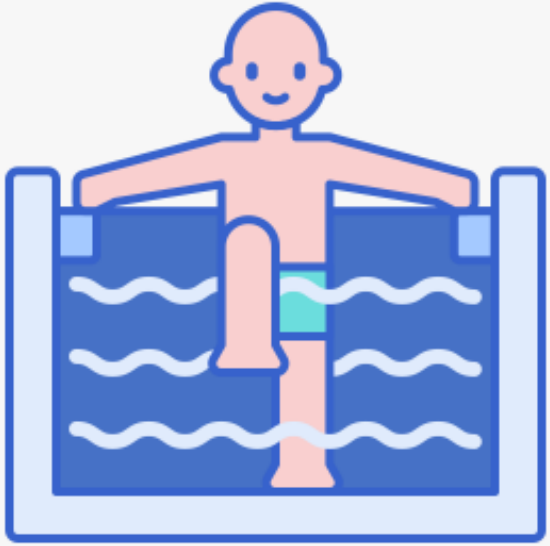
- Challenge to maintain appropriate cleaning and disinfection practices within simulation environments such as “therapy apartments”
- Used to evaluate a patient’s ability to function on their own
- Activities of daily living (ADLs) such as cooking are performed within these settings
- Special attention to detail for cleaning and disinfection policies for these environments- Follow equipment’s IFUs
- Ensure policies & procedures are up-to-date!



APIC Text accessed April 2025

WATER SAFETY

- Includes hydrotherapy, whirlpools and aquatic therapy pools used to treat pain and immobility, and for recreation and relaxation
- Water can be a source of transmission of infectious organisms and has been linked to cases of legionellosis, sepsis, and cellulitis
- Patients excluded from therapy- those with open wounds, fecal incontinence, on transmission-based precautions
- Immersion tanks and whirlpools must be drained between each patient use and cleaned and disinfected with according manufacturers' IFUs
- Facilities should maintain proper chlorination levels and can consider antiseptic chemicals



APIC Text accessed April 2025

TECHNOLOGY

- Speech and occupational therapists use an array of technologies in their therapies such as eye-tracking hardware, voice simulators, and computer tablets for patient use
- IPC challenge- to safely incorporate the use of devices by multiple patients into a healthcare setting when the devices could be damaged or rendered inoperable by moisture or disinfectants
- Strategies include:
    - hand hygiene before and after use of the device
    - place devices in disposable or cleanable reusable plastic covers
    - routine cleaning and disinfection when visibly soiled, between patients, and at the end of the day
    - risk assessment for patients on precautions
    - consider adjunct technology such as UVC

APIC Text accessed April 2025

Consider labeling equipment as clean/dirty

- In highly interactive areas (e.g., PT/OT) where turnover of equipment is fast-paced, labeling surfaces may increase disinfection compliance (personal experience)
- Print on two-sided paper, laminate, flip signs as needed.
- Train staff!

ENGAGING PATIENTS IN DISINFECTION

- Integrate cleaning & disinfection into the **rehabilitation plan**, just as we do hand hygiene!
- Teach patients the key **moments**!
- **Disinfectant safety** is crucial if/when engaging patients.

Summary of Considerations for Cleaning and Disinfection in Rehabilitation Facilities

- Purchase equipment compatible with your healthcare approved disinfectant
- Use single use supplies if available
- For reusable equipment, properly apply disinfectants and follow MIFUs
- Use non-porous equipment options if available
- Consider UVC as an adjunct to routine cleaning and disinfection
- Replace equipment with tears, cracks etc.
- Prevent skin contact to equipment if possible- plastic on electronic devices, liners and other barriers that may be single use or reusable (cleanable)
- Consider seeing patients on isolation precautions at the end of the day to allow time for thorough cleaning and disinfection

ENVIRONMENTAL CLEANING & DISINFECTION IN DIALYSIS

DIALYSIS FACTS

- More than 850 million people worldwide are living with chronic kidney disease (CKD)
- Between 5.3 and 10.5 million people require dialysis or transplantation but many do not receive these treatments due to lack of resources or financial barriers
- Annual cost of dialysis per patient in the US is $88,195

International Society of Nephrology (ISN)

More than 850 Million Worldwide have some form of Kidney Disease: Help Raise Awareness - International Society of Nephrology

DIALYSIS RISK FACTORS

- Comorbidities
  - Diabetes
  - Hypertension
  - Hyperlipidemia
  - Cardiovascular disease
- AV fistula/grafts not w/o risk
- Peritoneal tubing
- Age/Sex
- Access to healthcare

DIALYSIS OUTBREAKS

- Adverse drug & **device events**
- **Bacterial & fungal infections**
- Chemical intoxication
- **Hepatitis**
- **Peritoneal dialysis**
- **Water-associated**

https://www.cdc.gov/dialysis/reports-news/outbreaks.html

DIALYSIS OUTBREAKS

Outpatient hemodialysis facility (58)	2018	PA	108	2	Specific lapses in infection control not identified, however, practices observed at the time of the investigation may have not represented usual facility practices. Case patients were dialyzed in close proximity and cared for by the same staff.	Of these two new acute case-patients identified in 2018, one had HCV virus genetically related to virus from two facility patients with chronic infection who had been part of an earlier 2015 outbreak at this same location, listed below.
Outpatient hemodialysis facility (53)	2017	GA	47	2	Patients were dialyzed in close proximity and cared for by the same staff Lapses identified included environmental cleaning, hand hygiene	
Outpatient hemodialysis facility (33)	2016	unspecified	203	2	Specific lapses in infection control not identified at the time of the investigation	
Outpatient hemodialysis facility (54)	2016	PA	154	2	Breaches in environmental cleaning and disinfection practices identified included: lapses in hand hygiene, mixing of clean and dirty areas, inadequate cleaning of stations between patients	
Outpatient hemodialysis facility (51)	2015	NJ	237	2	Multiple lapses in infection control identified, including hand hygiene and glove use, vascular access care, medication preparation, cleaning and disinfection	

https://www.cdc.gov/dialysis/reports-news/outbreaks.html

DIALYSIS OUTBREAKS

Outpatient hemodialysis facility (51)	2015	NJ	84	2	Multiple lapses in infection control identified, vascular access care, medication preparation, cleaning and disinfection	
Outpatient hemodialysis facility (51)	2015	NJ	98	2	Multiple lapses in infection control identified, including hand hygiene and glove use, vascular access care, medication preparation, cleaning and disinfection	
Outpatient hemodialysis facility (52)	2015	PA	115	3	Multiple lapses in infection control identified, medication preparation close to treatment area	
Outpa hodial (52)	2015	PA	130	3	Multiple lapses in infection control identified, medication preparation close to treatment area	
			97	2	Multiple lapses in infection control identified, medication preparation close to treatment area, Use of single-dose vials for >1 patient, no separation of dirty and clean areas	(Philadelphia)
		CA	28	3	Breaches in environmental cleaning and disinfection practices	
Outpa hodial y (34)	2014	WA	186	3	Breaches in environmental cleaning and disinfection practices identified included: failure to consistently change gloves and perform hand hygiene	

DIALYSIS = INCREASED ENVIRONMENTAL RISKS!

https://www.cdc.gov/dialysis/reports-news/outbreaks.html

CDC AUDIT TOOL

Infection Prevention does NOT own auditing. Engage unit staff in their own performance!

BUT *do* visit HD areas frequently

Facility Name:_____ Observer:_____

Date:_____ Day: M W F Tu Th Sa Shift: 1st 2nd 3rd 4th Start time:_____AM / PM

Audit Tool: Hemodialysis station routine disinfection observations*

(Use a "√" if action performed correctly, a "Φ" if not performed/ performed incorrectly. If not observed, leave blank. All applicable actions within a row must have "√" for the procedure to be counted as successful.")

*This audit tool applies when there is no visible soil on surfaces at the dialysis station. If visible blood or other soil is present, surfaces must be cleaned prior to disinfection.

Discipline	All supplies removed from station and prime bucket emptied	Gloves removed, hand hygiene performed	Station is empty before disinfection initiated**	New clean gloves worn	Disinfectant applied to all surfaces and prime bucket	All surfaces are wet with disinfectant	All surfaces allowed to dry	Gloves removed, hand hygiene performed	No supplies or patient brought to station until disinfection complete

Discipline: **P**=physician, **N**=nurse, **T**=technician, **S**=student, **O**=other

Duration of observation period: _____

Number of procedures performed correctly = _____

Total number of procedures observed during audit = _____

ADDITIONAL COMMENTS/OBSERVATIONS:

** Ensure the patient has left the dialysis station before disinfection is initiated.

MAKING DIALYSIS SAFER COALITION

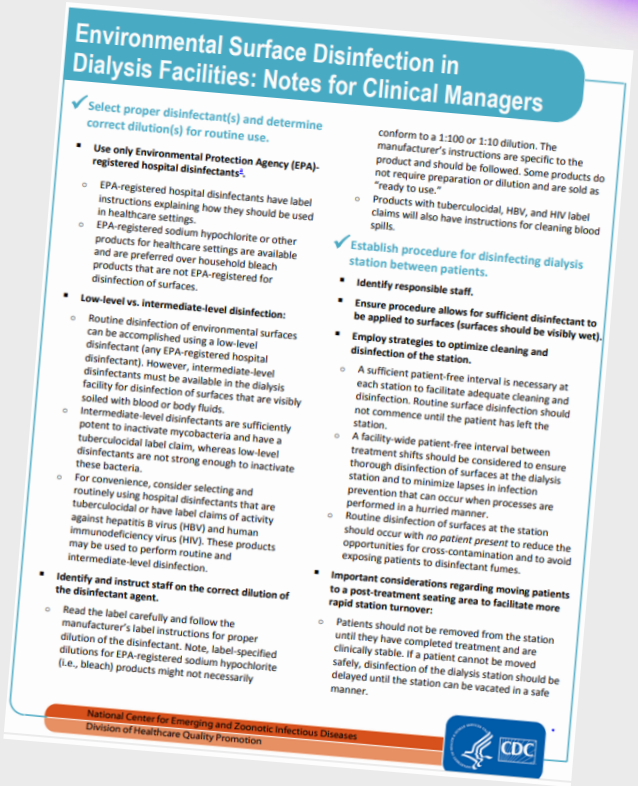
National Center for Emerging and Zoonotic Infectious Diseases
Division of Healthcare Quality Promotion

CDC

https://www.cdc.gov/dialysis/PDFs/dialysis-Station-Disinfect-Tool-508.pdf

CDC'S ENVIRONMENTAL DISINFECTION IN DIALYSIS: NOTES FOR CLINICAL MANAGERS

- Select proper disinfectant(s) and determine correct dilutions, surface compatibility & **IFUs**
    - **CDC: unclear guidance (→) regarding low versus intermediate level disinfection.**
- Establish procedures for disinfecting dialysis stations between patients.
- Ensure all staff have been properly trained.
- Ensure staff have access to supplies (PPE, cleaning tools, waste management, etc.)



Environmental Surface Disinfection in Dialysis Facilities: Notes for Clinical Managers

✓ Select proper disinfectant(s) and determine correct dilution(s) for routine use.

- **Use only Environmental Protection Agency (EPA)-registered hospital disinfectants[5].**
    - EPA-registered hospital disinfectants have label instructions explaining how they should be used in healthcare settings.
    - EPA-registered sodium hypochlorite or other products for healthcare settings are available and are preferred over household bleach products that are not EPA-registered for disinfection of surfaces.
- **Low-level vs. intermediate-level disinfection:**
    - Routine disinfection of environmental surfaces can be accomplished using a low-level disinfectant (any EPA-registered hospital disinfectant). However, intermediate-level disinfectants must be available in the dialysis facility for disinfection of surfaces that are visibly soiled with blood or body fluids.
    - Intermediate-level disinfectants are sufficiently potent to inactivate mycobacteria and have a tuberculocidal label claim, whereas low-level disinfectants are not strong enough to inactivate these bacteria.
    - For convenience, consider selecting and routinely using hospital disinfectants that are tuberculocidal or have label claims of activity against hepatitis B virus (HBV) and human immunodeficiency virus (HIV). These products may be used to perform routine and intermediate-level disinfection.
- **Identify and instruct staff on the correct dilution of the disinfectant agent.**
    - Read the label carefully and follow the manufacturer's label instructions for proper dilution of the disinfectant. Note, label-specified dilutions for EPA-registered sodium hypochlorite (i.e., bleach) products might not necessarily conform to a 1:100 or 1:10 dilution. The manufacturer's instructions are specific to the product and should be followed. Some products do not require preparation or dilution and are sold as "ready to use."
    - Products with tuberculocidal, HBV, and HIV label claims will also have instructions for cleaning blood spills.

✓ Establish procedure for disinfecting dialysis station between patients.

- **Identify responsible staff.**
- **Ensure procedure allows for sufficient disinfectant to be applied to surfaces (surfaces should be visibly wet).**
- **Employ strategies to optimize cleaning and disinfection of the station.**
    - A sufficient patient-free interval is necessary at each station to facilitate adequate cleaning and disinfection. Routine surface disinfection should not commence until the patient has left the station.
    - A facility-wide patient-free interval between treatment shifts should be considered to ensure thorough disinfection of surfaces at the dialysis station and to minimize lapses in infection prevention that can occur when processes are performed in a hurried manner.
    - Routine disinfection of surfaces at the station should occur with *no patient present* to reduce the opportunities for cross-contamination and to avoid exposing patients to disinfectant fumes.
- **Important considerations regarding moving patients to a post-treatment seating area to facilitate more rapid station turnover:**
    - Patients should not be removed from the station until they have completed treatment and are clinically stable. If a patient cannot be moved safely, disinfection of the dialysis station should be delayed until the station can be vacated in a safe manner.

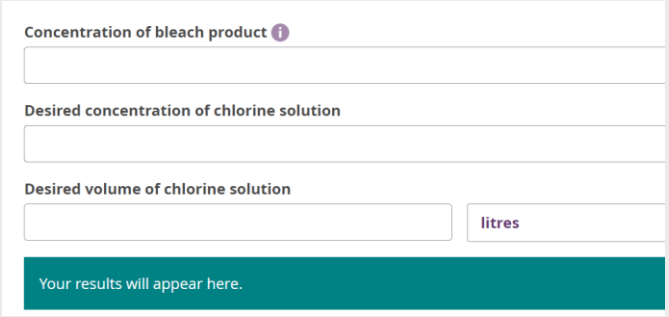
National Center for Emerging and Zoonotic Infectious Diseases
Division of Healthcare Quality Promotion

https://www.cdc.gov/dialysis/PDFs/collaborative/Env_notes_Feb13.pdf

DIALYSIS & SODIUM HYPOCHLORITE USE: KEY CONSIDERATIONS

- Sodium hypochlorite (“bleach”) may be used heavily in dialysis, *despite* alternatives with less corrosion, shorter contact times & better safety profiles.
- Check for correct bleach dilutions!
  - Ready-to-use products do not conform to a 1:10 or 1:100 dilution!
- Not all bleach is equal!
  - Ensure an EPA registration number (some bleach is just for laundry and has no disinfection claims)
- Bleach may not contain surfactants (chemicals that aid in soil penetration & removal)
- Manual mixing leads to errors!
- Many bleach solutions are two-step cleaner/disinfectants. Two-step cleaning is a heavy resource burden. Some will even require a third rinsing step with water to reduce salty residues.

Public Health Ontario Bleach Calculator



https://www.publichealthontario.ca/en/health-topics/environmental-occupational-health/water-quality/chlorine-dilution-calculator

TOOLS TO BOOST COMPLIANCE

Checklist: Dialysis Station Routine Disinfection

This list can be used if there is no visible soil on surfaces at the dialysis station. If visible blood or other soil is present, surfaces must be cleaned prior to disinfection. The proper steps for cleaning and disinfecting surfaces that have visible soil on them are not described herein. Additional or different steps might be warranted in an outbreak situation. Consider gathering necessary supplies[1] prior to Part A.

Part A: Before Beginning Routine Disinfection of the Dialysis Station

- ☐ Disconnect and takedown used blood tubing and dialyzer from the dialysis machine.
- ☐ Discard tubing and dialyzers in a leak-proof container[2].
- ☐ Check that there is no visible soil or blood on surfaces.
- ☐ Ensure that the priming bucket has been emptied[3].
- ☐ Ensure that the patient has left the dialysis station[4].
- ☐ Discard all single-use supplies. Move any reusable supplies to an area where they will be cleaned and disinfected before being stored or returned to a dialysis station[5].
- ☐ Remove gloves and perform hand hygiene.

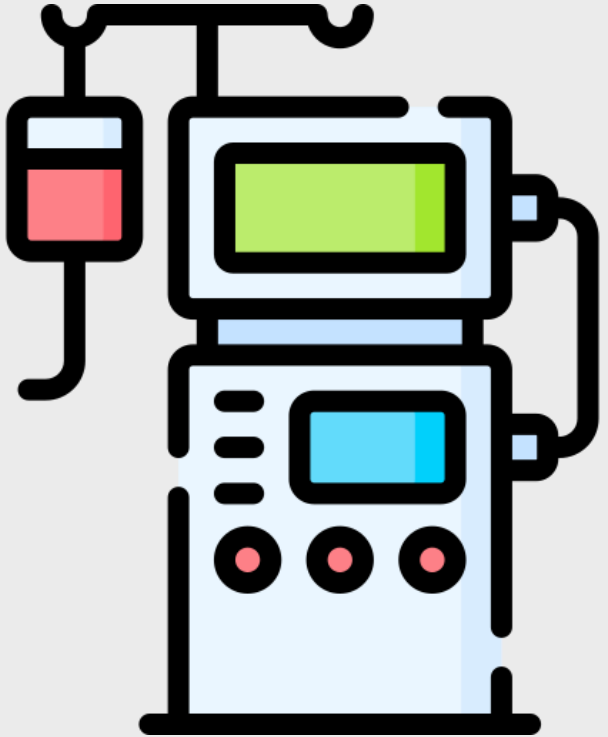
PART B: Routine Disinfection of the Dialysis Station – AFTER patient has left station

- ☐ Wear clean gloves.
- ☐ Apply disinfectant[6] to all surfaces[7] in the dialysis station using a wiping motion (with friction).
- ☐ Ensure surfaces are visibly wet with disinfectant. Allow surfaces to air-dry[8].
- ☐ Disinfect all surfaces of the emptied priming bucket[3]. Allow the bucket to air-dry before reconnection or reuse.
- ☐ Keep used or potentially contaminated items away from the disinfected surfaces.
- ☐ Remove gloves and perform hand hygiene.

Do not bring patient or clean supplies to station until these steps have been completed.

MAKING DIALYSIS SAFER COALITION

CDC Centers for Disease Control and Prevention National Center for Emerging and Zoonotic Infectious Diseases



[Resources & Tools | Dialysis Safety | CDC]

TOOLS TO BOOST COMPLIANCE

Clean and Disinfectant Patient Area

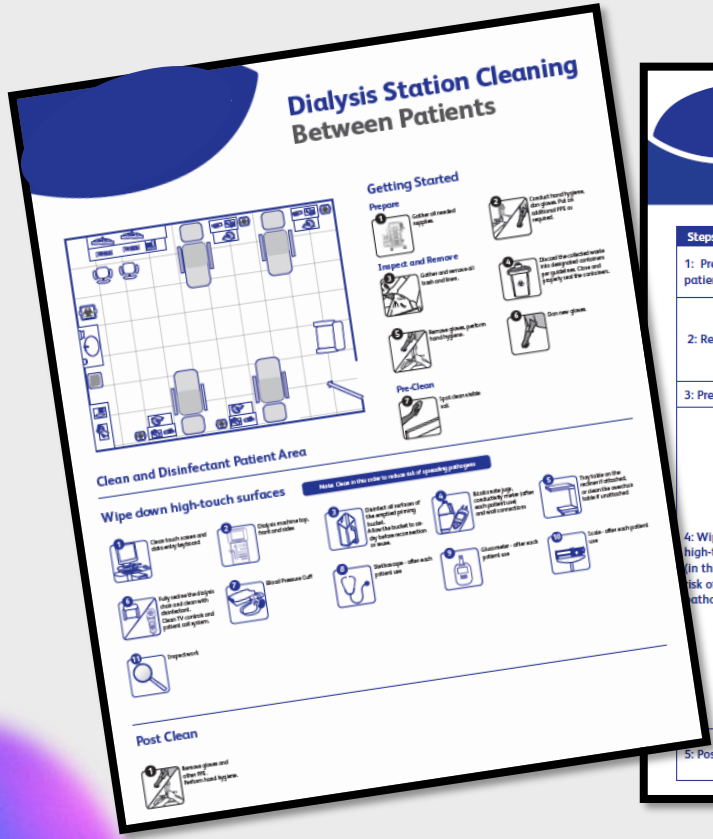
Wipe down high-touch surfaces

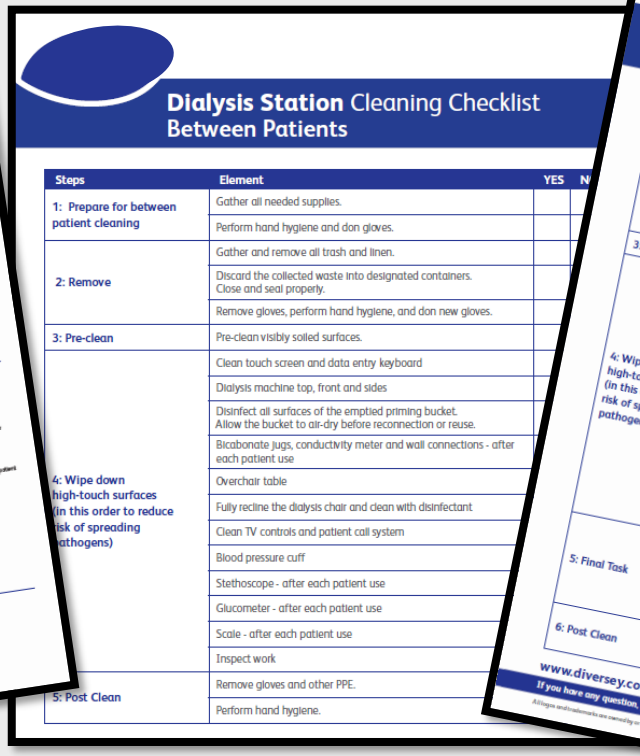
Note: Clean in this order to reduce risk of spreading pathogens

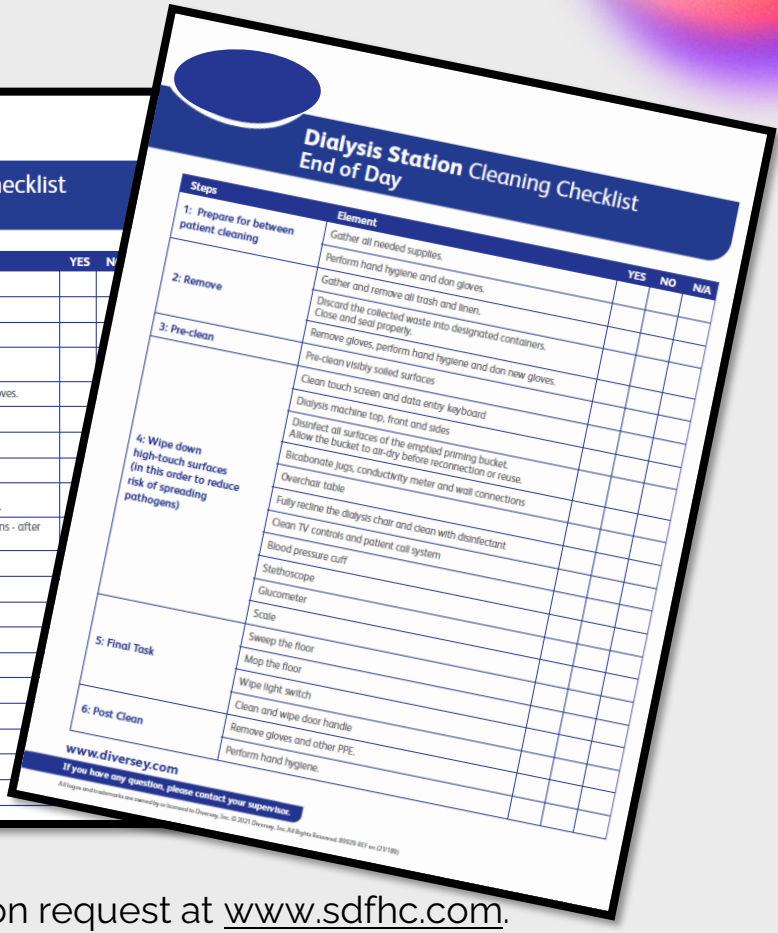
1.  Clean touch screen and data entry keyboard
2.  Dialysis machine top, front and sides
3.  Disinfect all surfaces of the emptied priming bucket. Allow the bucket to air-dry before reconnection or reuse.
4.  Bicabonate jugs, conductivity meter (after each patient use) and wall connections
5.  Tray table on the recliner if attached, or clean the overchair table if unattached
6.  Fully recline the dialysis chair and clean with disinfectant. Clean TV controls and patient call system.
7.  Blood Pressure Cuff
8.  Stethoscope - after each patient use
9.  Glucometer - after each patient use
10.  Scale - after each patient use
11.  Inspect work

Customized wall charts & checklists available upon request at www.sdfhc.com.

TOOLS TO BOOST COMPLIANCE







Customized wall charts & checklists available upon request at www.sdfhc.com.

DIALYSIS WALL BOXES

- Frames recessed into the wall at each hemodialysis station with connections for the dialysis machine to receive acid and base concentrates and treated water, and dispose of waste products
- Can become easily contaminated with microorganisms, which can subsequently be transferred to dialysis patients, a vulnerable group at high risk of infection
- Need to be cleaned, disinfected, and properly maintained to decrease risk of patient infections
- Large outbreak linked to wall boxes, a previously undescribed source of contaminated fluid and biofilms in the immediate patient care environment: https://www.ajkd.org/article/S0272-6386(19)30797-8/abstract

Dialysis Wall Boxes and Drains | Dialysis Safety | CDC

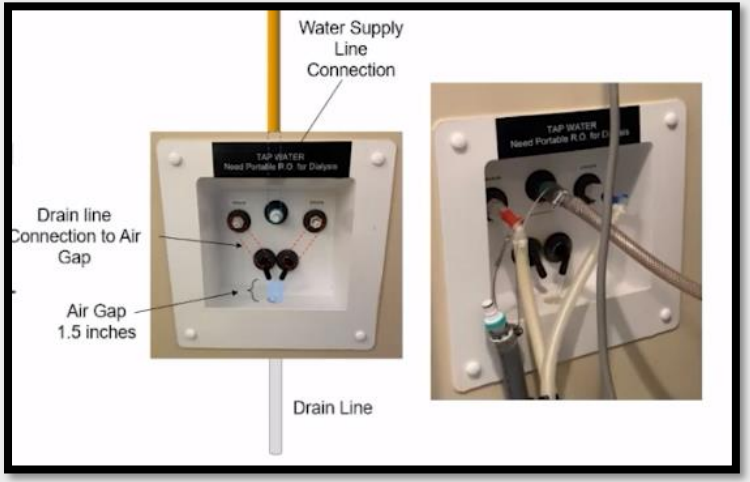
DIALYSIS WALL BOXES

- Staff **unaware** of infectious risks associated with wall boxes & necessary IP measures.
- Part of the immediate patient care environment & are considered **contaminated** or **dirty**.
- Wall boxes contain **drains** that are predisposed to the development of **biofilms**.
- May become **clogged**; splashing & foaming at the wall box may occur.
- **Biofilms** in wall box drains may contain opportunistic pathogens that can cause Healthcare-associated Infections (HAIs).
    - Gram negative bacteremia in dialysis patients are a **red flag for water-associated contamination**

https://www.cdc.gov/dialysis/guidelines/wall-boxes.html

DIALYSIS OUTBREAK: WALL BOXES

- Wet with visible pooling of water
- Staff interviews foul odors, clogging, lack of hand hygiene after touching wall boxes
- Every wall box had contamination with PA, SM and E. cloacae
- WGS confirmed association between patient & wall box isolates
- CVCs, dialyzing later in the day, and increased staff involved in dialysis session were identified risk factors



Novosad 2019: https://www.ajkd.org/article/S0272-6386(19)30797-8/pdf

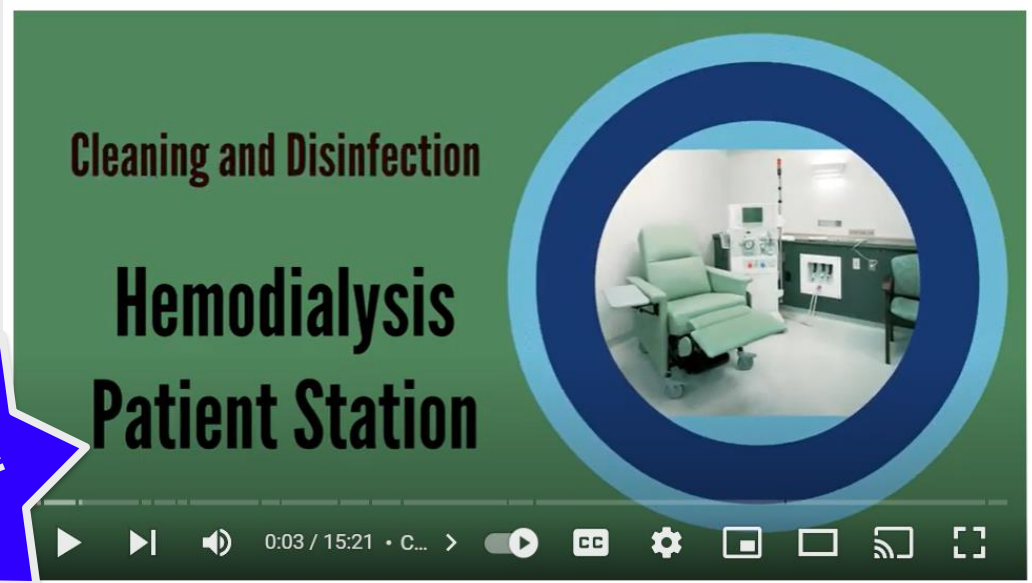
CDC Webinar via YouTube https://www.youtube.com/watch?v=kzRiS5ZG3Jk

DIALYSIS: WALL BOXES CONTROL MEASURES

- Educate staff on the risks associated with wall boxes to prevent wall box related infections
- Perform HH after coming into contact with the wall box or components and regularly assess compliance with HH
- Develop P&P outlining frequency and methods for wall box surface disinfection (disinfect at least daily or more frequently using an EPA registered disinfectant)
- C&D AFTER the patient has left the station- all surfaces of the wall box and attached hoses and associated high tough surfaces
- Discard wipes or cloths used to clean wall box after use (DO NOT use on other surfaces in the dialysis station
- Follow MIFUs for disinfectant dilution, preparation, contact time and use

DIALYSIS CLEANING & DISINFECTION EDUCATION

Excellent resource!



https://www.youtube.com/watch?v=SJpGSKzHg9w

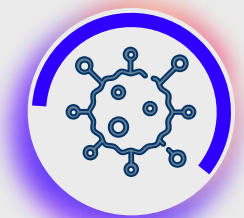
VALIDATION

VALIDATION METHODS

VISUAL AUDIT

FLUORESCENT MARKER

ATP



CULTURE

https://www.cdc.gov/hai/toolkits/evaluating-environmental-cleaning.html

Validating the Environmental Hygiene Program*





METHOD	PROS	CONS
Visual audits	Easy to perform, cost effective, engages staff	Difficult to standardize, may be seen as punitive w/o team engagement, Hawthorne effect, IP resources
Satisfaction surveys	Encourages resident participation, including family & visitors, quantitative measurement	Subjectivity, **emphasizes visible cleanliness only, not true disinfection**, no benchmarking
Environmental culture	May be useful during an outbreak or research project, quantitative	Not recommended by CDC as routine measure, **high cost**, long turn around times, results may not correspond to the outbreak
ATP	Easy to use & train others, immediate feedback, can be helpful when evaluating new/novel cleaning methods	Detection of organic matter (bioburden) is **not reliable predictor** of infection risk, **high cost of equipment & supplies**, storage of swabs
Fluorescent marking	Very inexpensive, easy to perform, immediate results	Does not identify pathogens, only detects cleaned/not cleaned, may be seen as punitive w/o team engagement

Modified from Infection Prevention Guide to LTC 2nd ed, APIC, 2017.

THANKS!

ANY QUESTIONS?

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