Hard Surface Disinfection Versus Soft Surface Sanitization

Technical Talk

Revision A, February 2019

Background

Disinfection and sanitization are critical elements to improving and maintaining facility cleanliness and overall staff and patient safety. Respective disinfection and sanitization protocols can differ from facility to facility due to variables such as: number of beds, geographic location, budget, staff concerns, surface substrates, furniture, time, etc. Marrying the disinfectant and facility process, which includes the many facility variables, helps to create a great disinfection protocol. The differentiation between "hard non-porous surfaces" and "soft surfaces" is a common area of confusion. As a manufacturer of disinfectant and sanitizer chemistries, we feel it is important to help differentiate these common questions to build knowledge and help decision makers develop sound disinfection protocols and safer facilities.

What is the difference between a US EPA registered disinfectant and a US EPA registered sanitizer?

United States Environmental Protection Agency ("US EPA") registered disinfectants and sanitizers are chemistries that offer two different claim sets. This is largely driven by the fact that the US EPA categorizes disinfectants and sanitizers in separate tiers as it relates to microorganism kill and removal.

1. The US EPA Performance Standard for sanitizers requires a reduction of at least 99.9% (3-log reduction) in the number of test microorganisms. The "sanitizer" claim is based on laboratory testing of two bacterial pathogens. These are *Staphylococcus aureus* and either *Klebsiella pneumoniae* or *Enterobacter aerogenes*.
2. The US EPA Performance Standard for disinfectants requires a significantly higher level of reduction, 99.9999% reduction/kill (6-log reduction). US EPA registered disinfectants are identified as a higher level of pathogen removal and their efficacy can vary based on tested pathogens (claims can range from HIV-1 to *Clostridium difficile* spores). The US EPA's top tier as it relates to pathogen kill in healthcare would be sterilants, which are tested and proven to completely eliminate or destroy pathogens. Sterilization is required in some healthcare settings and it provides a mean of cleansing surgical instruments/equipment that may enter the human body.

What are the differences between hard surfaces and soft surfaces?

Determination of surface substrates (metal, plastic, fabric, etc.) and surface types (hard versus soft) in a facility is critical and must be understood prior to choosing a disinfectant.

What are hard surfaces?

Hard surfaces can be porous and non-porous. Hard non-porous surfaces are typically those that consist of stainless steel, glass, solid surfaces, sealed floor tiles, and rigid plastics. Examples of hard porous surfaces are unsealed concrete or granite, unsealed floor tiles and wood. It is a common misconception that all hard surfaces are non-porous. Hard porous surfaces can be properly sealed with floor finishes or protectors to prevent moisture, dirt, sediment, oil, or even pathogens from burrowing into the surfaces.

Porous really means that the surfaces are not completely flat and there are small spaces, channels, or holes in which liquid or air may pass through. These minute spaces offer access to dirt, debris, moisture, and even microorganisms. Floor coatings, sealers, or protectors can be added to such porous surfaces to offer protection and seal these channels. Surfaces damaged or continually cleaned and/or disinfected with harsh chemistries (high or low pH) may degrade and expose the surface, therefore rendering it porous once again. Under these conditions, selecting a compatible disinfectant is strongly advised.

What are soft surfaces?

Soft Surfaces are most likely comprised of a form of fabric, usually some kind of polyester, nylon, cotton, or canvas. Typical soft surfaces in health care are mattresses, curtains, upholstered furniture, and clothing. Soft surfaces are generally more vulnerable to harsher chemistries and have the potential for harboring pathogenic microorganisms such as those that can contribute to Healthcare Acquired Infections (HAI's).

Why should facilities care? What level of disinfection and/or sanitization is available?

A US EPA registered product's label has specific use instructions which may or may not limit the area in which the product can be used. Many disinfectants are effective for use on hard, non-porous surfaces. Such surfaces will not allow easy harboring of pathogens. Soft surface sanitization claims are limited, by the US EPA, to "sanitizers" or disinfectants with soft surface sanitization claims and respective specific use instructions. It is also important to note that US EPA soft surface sanitizers do not provide efficacy for viruses, fungi, or spores. It is much harder to achieve a 6-log reduction in efficacy on a soft surface, such as a fabric due to the intrinsic nature of these substrates and their availability to absorb and shield pathogens from such chemicals.

Soft surface sanitization is a critical point of emphasis in healthcare and maintaining a sound disinfection protocol. According to Mary McGoldrick, MS RM CRNI, article on Soft Surface Sanitization, "*Pathogens on soft surfaces can survive for prolonged periods of time, and can be transferred to the hands and items used or worn by staff and patients who touch a contaminated soft surface, and then transferred to other surfaces as well as directly to patients.*"

Pathogens such as Staphylococcus aureus (MRSA) and vancomycin- resistant enterococci (VRE) remaining on fabrics like polyester for up to 2-3 months (Neely & Maley, 2000). Once a facility has located a soft surface sanitizer, it is crucial for the facility to follow the on-label preparation and use directions vetted by the US EPA. Remaining cognizant to environmental factors such as the solutions evaporation rate based on airflow and facility temperature may have an effect on the contact time and the need to rewet a surface.

Another soft surface concern in healthcare are mattresses. A big driver of cost in facilities is furniture or surface replacement such as mattresses. According to the article "Cleaning Practices for Hospital Mattresses in Top US Adult Hospitals" in the American Journal of Infection Prevention, "*Most top adult hospitals in the US do not follow manufacturer's recommendations on appropriate cleaning and disinfection of hospital mattresses. This failure may result in inadequate cleaning and may damage the surface of the mattresses.*" It is important to locate a chemistry that is both compatible with the surface substrates/fabrics and labeled with appropriate soft surface sanitization claims in order to assure compliance with the US EPA.

Summary

In summary, when facilities are selecting a disinfectant, it is important to identify the type of surfaces present and review respective disinfectant or sanitizer labels for their tested effectiveness on the surface.

When working with facilities and determining the appropriate chemistry, ask questions such as:

- What is your patient room cleaning and disinfection procedure?
- How do you cleanse soft surfaces?
- What is the type of chemistry you use and what is its pH?
- Do you differentiate between hard and soft surface disinfection/sanitization?
- How long do you let chemicals sit on surfaces and/or do you perform a rinse step?
- Do you use two different chemistries on the same surface?

All questions help to direct the focus to chemistries with appropriate efficacy claim(s) (to remain in US EPA compliance), are compatible with the surfaces (can promote material longevity, save on costs, improve overall facility appearance), and most importantly improve or maintain a safe facility for patients and staff.

3M US EPA Registered Disinfectants and Sanitizers

US EPA Registered Disinfectants	
10-minute Contact Time Quat Disinfectant	3M™ Bathroom Disinfectant Cleaner Concentrate (Product No. 4, 3M™ Chemical Management Systems)
	3M™ Quat Disinfectant Cleaner Concentrate (Product No. 5, 3M™ Chemical Management Systems)
	3M™ Non-Acid Disinfectant Bathroom Cleaner Concentrate (Product No. 15, 3M™ Chemical Management Systems)
	3M™ Neutral Quat Disinfectant Cleaner Concentrate (Product No. 23, 3M™ Chemical Management Systems)
	3M™ HB Quat Disinfectant Cleaner Concentrate (Product No. 25, 3M™ Chemical Management Systems)
3 Minute Contact Time Spray Only Disinfectant	3M™ Disinfectant Cleaner RCT Concentrate (Product No. 40, 3M™ Chemical Management Systems)
5-Minute Contact Time Quat Disinfectant	3M™ MBS Disinfectant Cleaner Concentrate Fresh Scent (Product No. 41, 3M™ Chemical Management Systems)
	3M™ MBS Disinfectant Cleaner Concentrate (Product No. 42, 3M™ Chemical Management Systems)
Variable Contact Time Quat Disinfectant	3M™ TB Quat Disinfectant Ready-To-Use

US EPA Registered Disinfectants with Soft Surface Sanitization Claims	
10-minute Contact Time Quat Disinfectant	3M™ Quat Disinfectant Cleaner Concentrate (Product No. 5, 3M™ Chemical Management Systems)
3 Minute Contact Time Spray Only Disinfectant	3M™ Disinfectant Cleaner RCT Concentrate (Product No. 40, 3M™ Chemical Management Systems)

US EPA Registered Sanitizer (No-Rinse Food Contact Sanitizer Claim)	
1-minute Contact Time Quat Sanitizer	3M™ Sanitizer Concentrate (Product No. 16, 3M™ Chemical Management Systems)

US EPA Registered Sporicidal Disinfectant	
Variable Contact Time Disinfectant	3M™ C. diff Solution Tablets

1. http://www.homecareandhospice.com/pdfs/McGoldrick_Soft_Surface_Sanitizing.pdf
2. Neely, A. N., & Maley, M. P. (2000). Survival of enterococci and staphylococci on hospital fabrics and plastic. Journal of Clinical Microbiology, 38(2), 724-726
3. Cleaning Practices for Hospital Mattresses in Top US Adult Hospitals
   Hooker, Edmond Leigh. Jones, Kristen et al.
   American Journal of Infection Control , Volume 40 , Issue 5 , e43

Commercial Solutions
3M Center, Building 220 12E-04
St. Paul, MN 55144
1-800-328-0033
3M.com/Facility

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