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Environmental Asepsis
Cleaning and Disinfecting Clinical Contact Surfaces in the Dental Operatory

Disinfectants are generally grouped into three categories: low-level, intermediate-level, and high-level. Dental clinics need to select the appropriate strength disinfectant for the job. Low- and intermediate- level disinfectants are used to disinfect environmental surfaces. High-level disinfectants are used to disinfect heat-sensitive semicritical items and should never be used on environmental surfaces.

High-level disinfection: a disinfection process that inactivates vegetative bacteria, mycobacteria, fungi, and viruses but not necessarily high numbers of bacterial spores. The FDA further defines a high-level disinfectant as a sterilant used under the same contact conditions except for a shorter contact time.

Hospital disinfectant: a liquid chemical germicide that is registered by the EPA for use on inanimate objects in hospitals, clinics, dental offices, or any other medical-related facility. Efficacy has been demonstrated against *Salmonella enterica* (formerly *Salmonella choleraesuis*), *Staphylococcus aureus*, and *Pseudomonas aeruginosa*.

Intermediate-level disinfectant: a liquid chemical germicide that is registered by the EPA as a hospital disinfectant and with a label claim of potency as a tuberculocidal. Destroys vegetative bacteria, most fungi, and most viruses; does inactivate *Mycobacterium tuberculosis var. bovis*. Not necessarily capable of killing bacterial spores.

Low-level disinfectant: a liquid chemical germicide that is registered by the EPA as a hospital disinfectant. Destroys most vegetative bacteria, some fungi, and some viruses. Does not inactivate *Mycobacterium tuberculosis var. bovis*.

Clinical Contact vs. Housekeeping Surfaces

In the dental operatory environmental surfaces are surfaces or equipment that do not directly contact the patient. These surfaces frequently become contaminated during patient care and can serve as reservoirs of microbial contamination. Strategies for cleaning and disinfecting surfaces in patient-care areas should consider the

- potential for direct patient contact;
- degree and frequency of hand contact; and
- potential contamination of the surface with body substances or environmental sources of microorganisms (e.g., soil, dust, or water).

Because housekeeping surfaces have limited risk of disease transmission, they can be decontaminated with less rigorous methods than those used on patient-care items and clinical contact surfaces.

Type of Surface	Definition	Examples
Clinical Contact	Surfaces that may be touched frequently with gloved hands during patient care or that may become contaminated with blood or other potentially infectious material and subsequently contact instruments, devices, hands, or gloves.	Light handles, switches, dental x-ray equipment, chairside computers, reusable containers of dental material, drawer handles, faucet handles, countertops, pen, telephone handle, doorknob
Housekeeping	Surfaces that do not come into contact with devices used in dental procedures.	Floors, walls, sinks

Barriers vs. Cleaning and Disinfection

Two approaches can be taken to manage surfaces in the operatory: using surface barrier covers (e.g., clear plastic wrap, bags, sheets, tubing, and plastic-backed paper or other materials impervious to moisture) to prevent the surface or item from becoming contaminated or cleaning and disinfecting the surface after contamination occurs. Usually a combination of both approaches is used to effectively manage surfaces in the operatory. Using barriers to protect surfaces and equipment is useful, especially if the surfaces are

- touched frequently by gloved hands during patient care,
- likely to become contaminated with blood or other potentially infectious materials (OPIM), or
- difficult to clean (e.g., chair control panels, air/water syringe buttons, light handles).

In addition to being very effective, using barriers can save time because between patient cleaning and disinfection is eliminated.

Because barriers can become contaminated, they should be removed and discarded between patients, while dental health-care personnel (DHCP) are still gloved. Clean barriers should be placed on these surfaces before the next patient. It is not necessary to clean and disinfect a properly covered surface between patients unless the barrier fails or the surface became accidentally contaminated during barrier removal.



Examples of Items to Barrier-Protect

<ul style="list-style-type: none"> - Dental chair headrest and control panel - Hoses for handpieces, evacuators, and air/water syringes - Air/Water syringe handle - Dental unit light switch and handles - Dental unit bracket tray and handles 	<ul style="list-style-type: none"> - Radiographic equipment (e.g., cone, unit handles, control switches, view box switches) - Dental supply containers/bottles - Dental curing light handles and tip - Amalgamator control panel - Drawer handles - Shade selection guides
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Cleaning and Disinfecting Environmental Surfaces

1. Use appropriate personal protective equipment (PPE).

Because of the risks associated with exposure to chemical disinfectants and contaminated surfaces, DHCP who perform environmental cleaning and disinfection should wear gloves and other PPE to prevent occupational exposure to infectious agents and hazardous chemicals. Chemical- and puncture-resistant utility gloves offer more protection than patient examination gloves when using hazardous chemicals.

2. Clean the surface(s).

Cleaning is a form of decontamination that renders the environmental surface safe by removing organic matter, salts, and visible soils, all of which interfere with microbial inactivation.

The physical action of scrubbing with detergents and surfactants and rinsing with water removes substantial numbers of microorganisms. If a surface is not cleaned first, the success of the disinfection process can be compromised because blood or debris can shield underlying microorganisms from the disinfecting agent. Soap and water may be used to clean surfaces, however using a product that has both cleaning and disinfecting properties can be more convenient. If using a product that has both cleaning and disinfecting properties, after the surface is cleaned, the same product can be used in the disinfection step. When a surface cannot be cleaned adequately, it should be protected with barriers.

Using separate cleaning and disinfectant products is acceptable, however choosing a product that accomplishes both functions offers a more efficient approach.

3. Disinfect the cleaned surface(s).

If barriers are not used, surfaces must be cleaned and disinfected between patients by using an EPA-registered hospital disinfectant with a tuberculocidal claim* (i.e., intermediate-level disinfectant). It's important to follow manufacturer's label instructions for use, dilution, duration of contact, and compatible surfaces. Chemicals should remain in contact with the surface for the longest contact time indicated on the disinfectant label. Chemical compatibility with the item to be disinfected is a major consideration in selection. It is important to remember that some disinfectants can have a very detrimental effect on specific materials, resulting in immediate damage or long-term effects that can shorten the life of an item.

Manufacturers of dental devices and equipment should provide information regarding material compatibility with liquid chemical germicides, whether equipment can be safely immersed for cleaning, and how it should be decontaminated if servicing is required.

Also, general cleaning and disinfection are recommended for clinical contact surfaces, dental unit surfaces, and countertops at the end of the day and are required if surfaces have become contaminated since their last cleaning. To facilitate daily cleaning, treatment areas should be kept free of unnecessary equipment and supplies.

* Although the scientific evidence supports the use of low-level disinfectants if certain conditions are met (i.e., the product has both HIV- and HBV-label claims, the surface is not visibly contaminated with blood), for reasons of convenience USAF dental clinics will continue to use products with a higher degree of potency (i.e., intermediate-level disinfectant products) on environmental surfaces to cover all situations.

In USAF Dental Facilities, use chemical germicides that are:

- registered with the Environmental Protection Agency (EPA),
- hospital-grade (i.e., it kills three specific organisms: *Staphylococcus aureus*, *Salmonella enterica* (formerly *Salmonella choleraesuis*), *Pseudomonas aeruginosa*),
- intermediate-level disinfectants* (i.e., have tuberculocidal activity).

What to Look For on the Disinfectant Label

- EPA-registration number
- Manufacturer/distributor contact information
- Microorganisms shown to be killed in the laboratory testing and necessary contact time
- Active ingredients
- Directions for use including
 - dilution instructions, if required (pre-mixed or "ready-to-use" products are more convenient).
 - duration of contact (it is recommended to use the longest contact time on the label).
 - whether the product is also a cleaner (or if a separate cleaning agent is necessary before applying the disinfectant).
 - any special handling, storage, or disposal issues.



It's important to always follow manufacturer instructions regarding use, specifically contact time. Contact times vary with different brands and for different microbes; it is recommended to use the **longest contact time** on the label for disinfection. Do not just look for the tuberculocidal kill time and use that as the contact time; it may not be the longest recommended contact time on the label.

Disinfectant Liquids vs. Wipes

If used correctly, disposable cloth or paper disinfectant wipes are an effective choice for environmental asepsis in health-care settings. Because these products are saturated with chemical cleaners and antimicrobial agents they decrease the amount of chemicals sprayed in the environment. Most of the currently available disinfectant wipes contain a range of isopropanol concentrations in addition to other chemical agents which function primarily as surface cleaners. Originally, the disinfectant incorporated into the wipe evaporated quickly and it was difficult to keep the surfaces wet for the required



disinfection contact time. However, manufacturers addressed this issue by modifying the composition and thickness of the fabric and the amount of liquid absorbed into the wipe. As a reminder, to be effective two cloths must be used—one for cleaning and another for disinfecting the surface. While these disinfectant wipes may be a more convenient alternative to spraying chemicals to clean and disinfect surfaces, **the user is ultimately responsible for ensuring the product is used correctly and meets all of the requirements of a traditional liquid disinfectant, such as being an EPA-registered intermediate level disinfectant.**

Cleaning and Disinfecting Cameras, Digital Sensors, and Computers in the Dental Setting

Before purchasing high-tech equipment for use in the dental operatory, ask the following questions:

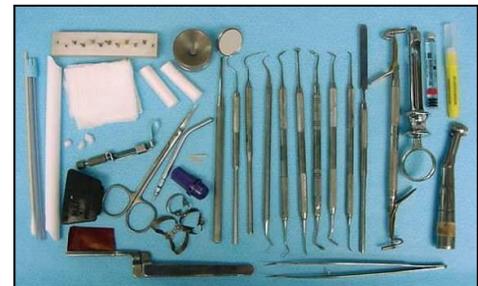
- Can it be adequately decontaminated?
- Can it be cleaned with soap and water?
- If indicated, can it be heat sterilized?
- Will barrier covers interfere with its function?
- Do you have to disassemble it before cleaning?
- Is there more than one approach to decontamination?
- Will the approach you choose affect the life of the equipment?

Digital x-ray sensors, cameras, and computers present unique infection control challenges. The best results with the least damage to the equipment are obtained by following manufacturer's directions. Avoiding contamination is important because many items cannot be properly cleaned and disinfected or sterilized. Before touching any office equipment, ensure your hands are clean, and if wearing gloves select a powder-free brand. If taking intraoral photographs, cover the appropriate parts of the camera with a plastic barrier before use. A computer keyboard and the mouse are other excellent

examples of difficult, if not impossible, items to clean. These items should be covered with a plastic barrier when contamination is likely, and the barrier changed between patients. If a reusable form-fitted barrier is used, it should be cleaned and disinfected between patients. To minimize the potential for device-associated infections, after removing the barrier from digital radiography sensors/plates, clean and disinfect using an EPA-registered hospital disinfectant with an intermediate-level activity after each patient.

Avoiding Cross-Contamination of Dental Supplies

Because many dental materials are packaged in multidose containers, bottles, or tubes DHCP need to avoid cross-contaminating these supplies when handling them during patient treatment. It is preferable to unit dose materials and supplies, that is dispense small amounts sufficient for care of one patient before treatment begins. Whatever is not used with the patient is discarded. Dental manufacturers are aware of the potential for cross contamination and many companies now offer unit-dose



packages of their product. Whenever possible, apply unit-dose practices because this limits contamination and time-consuming cleaning and disinfection procedures. If unit-dosing techniques are not used, the item should be covered with a barrier to avoid contamination. If a barrier is not used, the item must be cleaned and disinfected between patients if it becomes contaminated.

Additionally, whenever retrieving an item for patient-care, aseptic technique must be practiced. DHCP should use a sterile instrument (e.g., cotton pliers, forceps) when retrieving an item for use to avoid contamination of unused items in the container or drawer.

Cleaning & Disinfection In A Nutshell:

- Determine what surfaces will be handled or are likely to become contaminated during treatment.
- Cover surfaces that may become contaminated (especially those that are difficult to clean and disinfect).
- Clean and disinfect uncovered surfaces that become contaminated. If a surface is not contaminated during patient care, then that surface need not be disinfected between patients.



TEST YOUR KNOWLEDGE ABOUT CLEANING & DISINFECTION

1. _____-level disinfectants have demonstrated to be effective against *Mycobacterium tuberculosis*.
 - a. High
 - b. Low
 - c. Intermediate
 - d. b and c
2. Surfaces that are contacted frequently with gloved hands during patient-care or that may become contaminated with blood via spray and spatter in the dental operator are called _____ surfaces.
 - a. housekeeping
 - b. clinical contact
 - c. operator
 - d. touch
3. Which is **NOT** true regarding protective surface barriers?
 - a. Surface barriers are especially useful on difficult to clean and disinfect surfaces and equipment.
 - b. Barriers can be removed with ungloved hands.
 - c. It is not necessary to clean and disinfect a properly covered surface between patients unless the surface becomes accidentally contaminated during barrier removal.
 - d. Chair control panels, air/water syringe buttons, and light handles are examples of items to protect with barriers.
4. Environmental surface disinfectants must be registered with the _____.
 - a. EPA
 - b. FDA
 - c. CDC
 - d. OSHA
5. Using unit-dose practices limits cross-contamination and time-consuming cleaning and disinfection procedures.
 - a. True
 - b. False

Selected References and Additional Resources

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USAF Guidelines for Infection Control in Dentistry.

Answers: 1)c; 2)b; 3)b; 4)a; 5)a

PROPERTIES OF SELECT INTERMEDIATE-LEVEL (TUBERCULOCIDAL) SURFACE DISINFECTANTS

Always follow manufacturer instructions regarding use, specifically contact time. Contact times vary with different brands and for different microbes; it is recommended to use the **longest contact time** on the label for disinfection.

Note: The contact times are current as of 4/2015; users should refer to the product label for the most current instructions. Contact times are listed for comparison purposes and are subject to change.

Product Category	Examples of Active Ingredients	Product Example Brand name (Company)	Tuberculocidal Contact Time (minutes)	Longest Recommended Contact Time (minutes)	Type of Solution ¹	Contact Information
Chlorines	Sodium hypochlorite, commercial preparations of sodium hypochlorite with added surfactants	Clorox Healthcare® Bleach Germicidal Wipes (Bosworth Company)	3	3	Wipe	www.bosworth.com (800) 323-4352
Phenolics	Alcohol- or water-based and multiple phenolic compounds	Birex® SE (Biotrol)	10	10	Conc/Mix	www.biotrol.com (800) 822-8550
		Birex® Disinfectant Wipes (Biotrol)	10	10	Wipe	www.biotrol.com (800) 822-8550
		Coe Spray™ II (GC America)	10	10	RTU	www.gcamerica.com (800) 323-7063
		Lysol Brand II IC (Sultan Healthcare)	10	10	RTU	www.sultanhealthcare.com (800) 637-8582
		ProSpray™ (Certol International, LLC)	10	10	RTU	www.certol.com (800) 843-3343
		ProSpray™ Wipes (Certol International, LLC)	10	10	Wipe	www.certol.com (800) 843-3343
		Ready-To-Use Wex-Cide (Wexford Labs)	10	10	RTU	www.wexfordlabs.com (800) 506-1146
		Wex-Cide128 (Wexford Labs)	10	10	Conc/Mix	www.wexfordlabs.com (800) 506-1146
Alcohol-Based Quaternary Ammonium Compounds ²	Alcohol and multiple quaternary ammonium compounds	CaviCide® (Metrex)	3	3	RTU	www.metrex.com (800) 841-1428
		CaviCide1™ (Metrex)	1	1	RTU	www.metrex.com (800) 841-1428
		CaviWipes® (Metrex)	3	3	Wipe	www.metrex.com (800) 841-1428
		CaviWipes1™ (Metrex)	1	1	Wipe	www.metrex.com (800) 841-1428
		DisAseptic® XQR (Palermo Health Care)	5	10	RTU	www.palmerohealth.com (800) 344-6424
		DisCide® ULTRA (Palermo Health Care)	1	1	RTU	www.palmerohealth.com (800) 344-6424
		Envirocide® (Metrex)	3	3	RTU	www.metrex.com (800) 841-1428
		GC Spray-Cide™ (GC America)	6	6	RTU	www.gcamerica.com (800) 323-7063
		Opti-Cide-3® (Micro Scientific Ind.)	3	3	RTU	www.opticide.com (888) 253-2536
		Sani-Cloth® Bleach Germicidal Disposable Cloth (PDI company)	2	4	Wipe	www.pdipdi.com (800) 999-6423
		Super Sani-Cloth® Germicidal Disposable Wipe (PDI company)	1	2	Wipe	www.pdipdi.com (800) 999-6423
		Sani-Cloth® AF3 Germicidal Disposable Wipe (PDI)	3	3	Wipe	www.pdipdi.com (800) 999-6423
		Sanitex Plus Spray™ (Crosstex International)	6	6	RTU	www.crosstex.com (888) 276-7783
		Sanitex Plus Wipes™ (Crosstex International)	5	5	Wipe	www.crosstex.com (888) 276-7783
		Others/Misc	Accelerated hydrogen peroxide	OPTIM® 33TB Cleaner (SciCan)	5	5
OPTIM® 33TB Wipe (SciCan)	5			5	Wipe	www.scican.com (800) 572-1211
Clorox® Hydrogen Peroxide Cleaner (Bosworth Company)	4			4	RTU	www.bosworth.com (800) 323-4352
Clorox® Hydrogen Peroxide Cleaner Wipes (Bosworth Company)	5			5	Wipe	www.bosworth.com (800) 323-4352
CleanCide Wipes (Wexford Labs)	5			10	Wipe	www.wexfordlabs.com (800) 506-1146
Sodium bromide and chorine	MicroStat 2™ (Septodont, Inc)		5	5	Tab/Mix	www.septodontusa.com (800) 872-8305

The listing or omission of a product in this table does not imply endorsement, approval, or disapproval by DECS. The product examples listed are not intended to be all-inclusive or represent recommendations by the USAF.

¹ RTU: Ready to use; Conc: Concentrate/Mix with water; Tab/Mix: Tablet/Mix with water; Wipe: Disposable wipe/cloth presaturated with disinfectant

² All alcohol-free quaternary ammonium compounds (quats) are categorized as low-level disinfectants and do not have tuberculocidal activity.

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