

# DISINFECTANTS:

## WHAT'S IN YOUR BUCKET?

### PART I

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This is part one in a four part series of articles intended to educate and inform IEHA members and non-members alike. With each of these four articles, there is a test of the reader's knowledge and grasp of these important concepts. You will have an opportunity to take the exam and submit it for continuing education units (CEU's) of credit toward maintaining your Certified Executive Housekeeper (CEH) or Registered Executive Housekeeper (REH) status.

The outline for this series is adapted with revisions from a reference book that should be on every IEHA member's bookshelf. The title is, "The Practical Application of Disinfection and Sterilization in Health Care Facilities" and is co-authored by James C. Cokendolfer and Jill F. Haukos. While this author does not agree with everything written in the guide by Cokendolfer and Haukos, this book has proven to be essential as a reference for questions surrounding the topic of chemical disinfectants and the process of disinfecting environmental surfaces.

So, let's get started with a few questions? What's in your bucket (or bottle)? Do you use a disinfectant? Do you need a disinfectant? How does one know what disinfectant to use? What are the laws, standards and regulations surrounding the proper use of disinfectants? What is the proper way to use disinfectants when sanitizing environmental surfaces? These and many other questions will be addressed in these articles intended to bring light to, what can be, a very confusing topic, disinfectants.

#### ~ WHO NEEDS TO UNDERSTAND DISINFECTION? ~

The answer is everybody in the business of cleaning the indoor environment. Not all the sick people in the world are in hospitals. Sick passengers share the air breathed on thousands of airplanes and cruise ships everyday. Millions of people feeling an onset of cold or flu symptoms share phones, touch doorknobs, elevator buttons, handrails and other inanimate objects every work day and in every workplace. Students and pre-school children are sent to schools and child care centers where they are encouraged to "share" everything. And

toddlers, students, employees and passengers “share” their sniffles, runny noses and coughs.

Hospitals have become a depository of very ill people. Have you or a relative had surgery or a medical procedure done lately? Medical insurance dictates that nobody stays in a hospital overnight unless they are v-e-r-r-y sick. Hospitals have basically become “intensive care” places where only very ill people or people with major surgery stay for more than one day.

Whether you are responsible for the cleaning activities of a hospital, long-term care facility, office building, school, or other public building, you need to understand disinfection. Others who need to understand disinfection include emergency responders, dentistry personnel, tattooists, artificial nail attendants and people who care for animals.

Without a basic understanding of the principles of disinfection, there is a greater chance for the spread of illness and perhaps life-threatening diseases. The primary use of disinfectants is to eliminate or greatly reduce microbial pathogens and thus prevent the transmission of disease and illness.

### ~ WHAT IS DISINFECTION? ~

Disinfection is a process. Disease-causing viruses, pathogens, bacteria, or other microbes can live on inanimate objects. The process of removing, reducing or killing those living organisms is called disinfection.

Cleaning is not the same as disinfecting. Cleaning may, and should, occur *before* disinfection. Washing or scrubbing a surface may physically remove soil and organic material such as blood and body fluids. Cleaning is a very important step in disinfection. By removing the organic soil, the right disinfectant has a much better opportunity to kill the target organisms. There is very little chance for the disinfectant to do its job in the presence of a bio-load of soil.

Disinfectants are chemicals that kill living organisms. In the United States, the EPA (Environmental Protection Agency) controls the registration of disinfectants just as they do pesticides. If a product claims to kill bacteria, fungi, or viruses, it will have an EPA establishment number on the label.

### ~ DO YOU NEED A DISINFECTANT? ~

Yes, 1) If local, state or federal regulations require the use of specific disinfectants for the cleanup of blood, body fluids or excrement; 2) If you are concerned with the possibility that environmental surfaces such as tables,

chairs, telephones, toilet seats, sink faucets, food preparation surfaces, handrails and doorknobs have become contaminated with microorganisms.

That being said, one must exercise caution when considering the purchase of all cleaning chemicals and disinfectants. More will be said later about criteria for selecting a disinfectant. For now let me say, be very concerned about the toxicity (both oral and dermal) of all chemicals used in your area of responsibility.

As environmental services and housekeeping professionals, we are guardians of the health of our staff, the customers we serve, and the environment. We must be vigilant, educated and tireless in our pursuit of safe (some would say “green”) cleaning chemicals and disinfectants.

### ~ WHY AND WHERE DO YOU NEED DISINFECTION? ~

During the late 80’s and early 90’s, AIDS (Acquired Immune Deficiency Syndrome), HIV (Human Immunodeficiency Virus) and Hepatitis B, and C emerged and remain a global concern. These bloodborne pathogens are life threatening and are not respectful of age, race, gender or sexual orientation. The term “infection control” is usually assigned to a person or department in a hospital or long-term care facility. The goal of infection control is to halt or limit the spread of bacteria, microorganisms and fungi. EPA-registered disinfectants are the main weapon in battle to control the transmission of hospital-acquired infections (HAI’s) that live and multiply on surfaces found in the patient’s environment.

In 1989, the CDC (Centers for Disease Control) said “blood is the single most important source of HIV and HBV in the workplace setting.” Every occupation, but especially healthcare workers, risk exposure from contact with another person’s blood.

There are three routes of entry for bloodborne pathogens: 1) Through breaks in the skin or open wounds/sores; 2) Injection with a needle or other instruments that can cut or break the skin; 3) Contact with mucous membranes (i.e. skin, eyes, nose or mouth).

The degree of risk to a worker, patient, resident or general public depends on the degree of exposure. Cokendolfer and Haukos state, “The following four factors are critical in assessing the potential risk of an exposure:

- **Sufficient number of organisms present to cause disease:** Each illness requires a certain number of infectious organisms to be present in order to cause disease. If only a small number of organisms are successfully transmitted, the host may not acquire the disease.

- **Virulence if the disease-producing organism:** Virulence is the potential or power of the organism to cause disease. The pathogen must first overcome environmental exposure and the body's defenses. In most cases, the organism must be viable outside the body. For example, HBV has been shown to remain viable (either in blood or bodily wastes containing blood, plasma or serum) and potentially infectious even after a week on a surface (Bond and others, 1981). HIV, on the other hand, has been shown to be susceptible to environmental influences and rarely survives outside of the human body. The risk of transmission of HIV is much lower than that of HBV. Less than 1% occupational parenteral exposures to HIV-contaminated blood or body fluids result in HIV infection, while similar exposures to HBV result in a 26% infection rate (Sattar and Springthorpe, 1991).
- **Route of entry:** In order for the pathogen to successfully transmit disease, it must be introduced in the host through the appropriate route of entry. Tuberculosis is most commonly transmitted via inhalation of airborne droplets, and thus, inhalation is the most successful route of exposure for this bacterium.
- **Host resistance:** Host resistance is the ability of the host to fight and prevent infection. Infection occurs as the result of an interruption in the body's normal defense mechanisms, which allow organisms to enter the body. Typically, the healthier the individual, the less likely he or she will become ill."<sup>1</sup>

When deciding *where* to disinfect, one must consider guidelines established by OSHA, CDC, state and local regulatory agencies. The answer to that question lays in **common sense** and **regulations**. Common sense dictates that "high touch" items are routinely disinfected. On the other hand, CDC states that Universal Precautions be used. Universal Precautions is based on the premise that there is a potential for infection with every drop of blood and certain other body fluids (e.g. Semen, vaginal secretions, cerebrospinal, synovial, pleural, peritoneal, pericardial and amniotic fluids). Those who believe that all body fluids, not just blood, are potentially infectious use Body Substance Isolation (BSI).

### ~ HOW DO YOU DISINFECT? ~

Although environmental surfaces can become contaminated with potential pathogens, these surfaces are not directly associated with transmission of disease or illness to healthy humans. The transfer of microorganisms from environmental surfaces to humans is largely via hand contact with the surface. Although hand hygiene is most important, the cleaning and disinfection of high touch surfaces is also very important.

The principles of cleaning and disinfecting environmental surfaces take into account the intended use of the surface or item. In other words, common sense or regulatory agencies may dictate surfaces needing disinfection. CDC (Centers for Disease Control) retains the Spaulding classification for medical and surgical instruments, which outlines three categories based on the potential for the instrument to transmit infection if the instrument is micro-biologically contaminated before use. These categories are “critical”, “semi-critical” and “noncritical”. In 1991, CDC proposed an additional category designated “environmental surfaces” to Spaulding’s original classification<sup>2</sup> to represent surfaces that generally do not come into direct contact with patients during care.

Environmental surfaces carry the least risk of disease transmission and can be easily decontaminated. These surfaces can further be divided into medical equipment surfaces (e.g., knobs or handles on hemodialysis machines, x-ray machines, instrument carts, etc.) and housekeeping surfaces (e.g., floors, walls, telephones, and tabletops).

These factors determine the choice of disinfection procedure for housekeeping (or environmental) surfaces: 1)the nature of the item to be disinfected, 2)the number of microorganisms present, 3)the innate resistance of those microorganisms to the inactivating effects of the disinfectant, 4)the amount of organic soil present, 5)the type and concentration of disinfectant used, 6)duration and temperature of disinfectant contact, and 7)if using a proprietary product, other specific indications and directions for use.

I know your eyes are glazing over about now, but stay with me. Spaulding proposed three levels of disinfection for the treatment of devices and surfaces that do not require sterility for safe use. These three levels are “high-level”, “intermediate-level” and “low-level”.

High-level disinfection is reserved for heat-sensitive, semi-critical medical instruments (e.g., flexible, fiberoptic endoscopes), inactivates all vegetative bacteria, mycobacteria, viruses, fungi and some bacterial spores. High-level disinfection is accomplished with powerful, sporicidal chemicals (e.g., glutaraldehyde, peracetic acid, and hydrogen peroxide) that are not appropriate for use on housekeeping surfaces. These high-level sterilants are highly toxic. Use of these chemicals on housekeeping surfaces is contrary to the label instructions and places the user in violation of laws pertaining to their use.

Intermediate-level disinfection does not necessarily kill bacterial spores, but it does inactivate *Mycobacterium tuberculosis* var. *bovis*, which is substantially more resistant to chemical germicides than ordinary vegetative bacteria, fungi, and medium to small viruses (with or without lipid envelopes). Chemical disinfectants with sufficient potency to achieve intermediate-level disinfection

include chlorine-containing compounds (e.g., bleach or sodium hypochlorite), alcohols, some phenolics and some iodophors.

Low-level disinfection inactivates vegetative bacteria, fungi, enveloped viruses (e.g. human immunodeficiency virus [HIV], and influenza viruses), and some non-enveloped viruses (e.g., adenoviruses). Low-level disinfectants include quaternary ammonium compounds, some phenolics, and some iodophors. Sanitizers are agents that reduce the numbers of bacterial contaminants to safe levels as judged by public health requirements, and are used in cleaning operations, particularly in food service and dairy applications. Germicidal chemicals that have been approved by FDA, as skin antiseptics, are not appropriate for use as housekeeping or environmental surfaces.

In summary, we have learned that:

- Everybody in the business of cleaning the indoor environment needs to understand the role disinfection plays in creating a safe, clean environment for those who occupy the building.
- A discussion of cleaning and disinfection helped us sort out the difference between the two.
- We answered the question of who needs a disinfectant in their arsenal of cleaning products.
- And, finally, we answered the question of why and where you need disinfection.

In Part II, we will have a discussion of the methods used to register disinfectants with EPA and FDA; what to look for when reading a germicide label; OSHA's attempt to protect workers exposed to bloodborne pathogens; and, the scientific guidelines and other governmental standards.

Note: Andi, I don't know how you want to introduce the quiz, send money if you want CEU's, etc. That's up to you.

Member Name \_\_\_\_\_ Membership No. \_\_\_\_\_

# DISINFECTANTS -

## WHAT'S IN YOUR BUCKET?

### PART I

#### Quiz for CEU credit

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Circle the letter of the best or most correct answer.

1. The number one use of disinfectants is to:
  - a. Clean toilets
  - b. Remove all germs and pathogens from a housekeeping surface.
  - c. Greatly reduce or eliminate microbial pathogens
  - d. Cleaning all environmental surfaces.
  
2. Another term for quaternary ammonium compounds is \_\_\_\_\_.
  
3. \_\_\_\_\_ are chemicals that kill living organisms.
  
4. HIV (Human Immunodeficiency Virus) can live for days outside the human body.
  - a. True
  - b. False
  
5. \_\_\_\_\_-Level disinfectants include some phenolics, bleach, and some iodophors.
  
6. Cleaning and disinfection are virtually the same thing.
  - a. True
  - b. False
  
7. The Spaulding classification includes these three categories \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_ instruments or surfaces.
  
8. Microorganisms are transferred from housekeeping surfaces to humans via \_\_\_\_\_ contact.