

**Technical Report**  
**Micro-Scientific Industries**

**An Objective Look at Disinfectant Selection**

*Don't Be Fooled by Smoke and Mirrors- You be the Judge*

J. Wagner, November 2003

**I**llusionists are able to fool their audiences through the use of smoke and mirrors in order to make the audience believe they see something that in reality is not there. The same holds true for some, but certainly not all, producers and marketers of disinfectant products. In the context of the use of disinfectants intended for the destruction of disease causing microorganisms in the healthcare facility this can and does frequently present a dangerous, life threatening situation for patients, healthcare professionals and the families of healthcare professionals.

**M**an has long known that certain microorganisms exist that produce deadly infections in humans. Certain individuals are especially susceptible; the aged, the very young, those with compromised immune systems, patients, surgical patients along with healthcare caregivers who attend to them to name a few.

Pathogenic (disease-causing) microorganisms exist in and on environmental surfaces within the healthcare facility. Just how these dangerous, microscopic living things come to exist within the health care facility is no mystery.

Introduce hundreds of sick people, some infected with infectious diseases, others with compromised immune systems and add maybe another hundred people into a large box. Lets call the box a hospital. Add to this all of the movement that takes place, all day long, within the box. Nurses going from room to room, x-ray technicians pushing machines into rooms and through the hallways, dietary delivering and picking up food trays between patients, physicians making rounds, respiratory therapists traveling around treating patients with respiratory infections, lab personnel going from patient to patient drawing blood not to mention the invasion of visitors and others such as sales representatives and delivery personnel entering and leaving the big box.

Picture some of these very people coughing and sneezing, patients bleeding, some suffering with infected weeping, draining wounds and others with infectious diarrhea. Many are touching bedrails, trays, equipment, doorknobs, elevator buttons and the like. With all of the activity, it is like taking the box, turning it upside down and shaking it up. Somewhere in this scheme somebody is going to catch something they did not have before they came in.

Infections picked up in a healthcare facility are referred to as nosocomial infections. That is, an infection acquired from within the healthcare facility itself. The recipient did not have the infection when he came in, but has it now. And the recipient does not necessarily have to be a patient; it could be a staff member or visitor.

There are a number of ways pathogens are transmitted. One such mode of transmission is via contaminated surfaces. Transmission of infectious microorganisms via this mode is referred to as cross-contamination. Disinfection procedures are intended to stop the cross-contamination of pathogens present on surfaces caused by touching or the spattering of bodily fluids such as blood, saliva and other excretions or secretions.

The misuse of liquid disinfectants can directly contribute to cross-contamination. Often the misuse occurs because the person performing the disinfection procedure simply misunderstands how the disinfection procedure needs to be performed to achieve the objective of surface disinfection. That is the destruction, mitigation or removal of the pathogens from the surface before they can be transmitted.

Some surfaces have a greater propensity to cause cross-contamination than others. In particular; equipment surfaces that travel from patient to patient and between floors such as wheel chairs and stretchers, respiratory therapy equipment, food carts, medicine carts, portable x-ray machines and devices used in the treatment of the critically ill or those most susceptible to infection.

Environmental surfaces of concern are bedrails, patient room doorknobs, toilet seats and sink faucets in that they are frequently touched by contaminated patient hands and then by nursing, visitors and other medical professionals and carried to other areas. Except in the case of blood spatter or spills, floors, walls and countertops generally require normal housekeeping cleaning and sanitation only. In all cases of blood spatter or spills, spot cleaning with the same level disinfectant used to disinfect equipment surfaces is appropriate for use on environmental surfaces.

Hospital-level disinfectants, tested and registered by the U.S. Environmental Protection Agency (EPA) provide the best, safest and most efficacious choice for use in a healthcare facility. Before entering the marketplace, disinfectants intended for use in hospitals and other healthcare facilities must undergo a plethora of scrutiny and scientific testing to attest to their ability to kill those microorganisms that cause cross-contamination.

The testing required by the U.S. EPA is based on sound scientific laboratory data. Each laboratory test performed must adhere to established scientific principals. The Pesticide Registration Branch of the U.S. EPA is charged by the Congress to oversee and regulate disinfectants sold in the US in order to protect the health and safety of the public at large. Disinfectants registered for use in healthcare facilities must be effective, at a minimum, against staphylococcus aureus, pseudomonas aeruginosa, salmonella cholerasuis and trichophytom mentagrophytes. OSHA requires TB and/or at least hepatitis b kill in addition to the EPA requirements. One newer generation disinfectant, Opti-Cide<sup>3</sup>® produced by Micro-Scientific Industries, Inc has shown, in addition to those listed above, its effectiveness against hepatitis C virus as well as vegetative Clostridium difficile (c.difficile) bacteria. This is a real breakthrough in hospital level disinfection because C.difficile bacteria have caused a number of outbreaks in US hospitals and long-term care facilities within the last decade. The hepatitis C virus is suspected of surviving on certain surfaces with the potential for cross-contamination. These new studies have been submitted to the EPA for addition to the product label and are presently being evaluated.

Disinfectants that display an EPA registration number on their label are approved for sale solely based on the specific instructions and claims listed on their package label. One must be cautioned to thoroughly read and fully understand the information contained on the package label, and just as important, the lack of information found in product brochures, advertisements and the statements of salespersons. Although the EPA attempts to monitor misleading claims, such misleading claims often sneak through causing the person using a particular product to misuse it. U.S. EPA labeled products all contain this required statement; *“Using this product in a manner that is not consistent with its label instructions is a violation of federal law.”*

Here are some examples of misleading information provided by disinfectant producers through what this author calls the “use of smoke and mirrors”.

A recent ad appeared in a leading publication that stated, *“Our disinfectant kills TB in just one minute”*. This may be true, but what the ad fails to mention is that the same product requires a 10 - minute contact time in order to kill staphylococcus, which incidentally causes the vast majority of nosocomial infections and related deaths of patients in US hospitals. It also failed to mention that its’ own labeled “instructions-for- use” require the product to remain wet on the surface for a full ten (10) minutes before wiping dry.

The key to understanding disinfectant ads and claims, contrasted with U.S. EPA registered product label claims, is that if a product requires 30 seconds to kill a particular microorganism and 10-minutes to kill another, the product is in effect a 10-minute disinfectant. This means that no matter which targeted microorganism on the label, irrespective of its individual kill time, the surface must remain wet for a full 10 minutes. The longest required kill time listed on the U.S. EPA registered label indicates the minimum amount of time the disinfectant must be in contact with the surface or instrument to be effective thus making all other claim times on the product label or advertisements irrelevant. Smoke and mirrors? You be the judge.

Over the Internet, a company claimed its product is totally safe and that the *‘EPA does not require it to list a precautionary warning statement on its label’*. In fact, the products own front label bears the statement *“CAUTION- Keep out of the Reach of Children”*. Smoke and mirrors? You be the judge.

When asked about the statement, the company claimed it *‘meant other precautionary warnings because all pesticides are required to bear a warning label’*. The company also claimed on the same website that it killed certain germs in 3 minutes, but it also failed to state it required 10 minutes to kill staphylococcus and other microorganisms. The company also failed to mention that its instructions for use require a 10- minute contact time after the surface has been thoroughly cleaned. Smoke and mirrors? You be the judge.

Producers of pre-moistened surface wipes sold in tubs frequently forget to warn users the towels may lose their effectiveness if the canister is not tightly sealed between uses. They also fail to tell users that the wipes may not, and probably will not keep surfaces wet for the tested contact time. If the contact time required for effectiveness is listed

at 10 minutes on the label, the surfaces must remain wet for the full 10 minutes in order to work. Not all facilities can use pre-moistened wipes due to the individual room temperature, humidity in the room and the ventilation or air exchanges. Facilities must take into account a number of factors before deciding which disinfectant is appropriate for use in their facility.

The best way to determine whether the use of a pre-moistened wipe is appropriate for use in a [particular facility is to test them. Simply test by wiping an area of about 3 square feet in size. Time how long the surface stays wet. If it is less than the labeled contact time of the product you are testing, you need to select another method of disinfection. If the surface stays *completely* wet for the entire time, you are in good shape. It is just that simple.

To add to the problem, some producers of disinfectants continue to depend on outdated information, which in the past relied solely on information long disproved through science or objective use of products. One such example is that at one time it was believed, by even the most authoritative experts, that disinfectants could be judged in regards to their ability to kill microorganisms based solely on the active ingredients listed on a label. It was believed that quaternary ammonium compounds (quats) could only kill certain microbes, while phenols could kill others. This is simply not true. As a matter of fact, both of these agents are equally lethal. Their ability to kill is derived from the synergistic activity and total combined efforts of the entire formulation.

A simple explanation lies in that there is distinct difference in the end result when a bullet is simply hand thrown or fired from a gun. The bullet represents the active ingredient while the bullet and gun together represent the entire process.

The total formulation as a whole determines whether a disinfectant is going to perform according to the desired results. This is why different disinfectant brands, even those that list the same active ingredients, are able to produce differing results. It is also for this very reason the U.S. EPA requires each disinfectant to be individually and independently tested on its own individual merits prior to registration.

Finally; a word regarding disinfectants and their effectiveness against microorganisms that have developed a resistance to antibiotics such as Methicillin Resistant Staphylococcus aureus (MRSA); Antibiotic resistant microorganisms are not resistant to U.S. EPA registered surface disinfectants. The mechanism by which surface disinfectants attack and kill microorganisms is completely different in the way in which microbes are attacked by antibiotics.

To avoid the “smoke and mirrors” used to distract from the real facts, simply read the label before you select a disinfectant. You be the judge.