The Selection of a Disinfection Product for Patient Care Devices & Equipment may be Key to the Prevention of Environmental Cross-Contamination

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Why is infection prevention important in the health care setting? Quite simply, in the era an informed health care consumer, appropriate infection prevention and control practices are expected. It is essential to protect the patient and medical staff from infectious agents likely to be encountered during care.

Outbreaks from a variety of infectious agents have occurred in health care facilities. The literature describes the major means of transmission of infectious agents as caused by person-to person contact via unwashed or inadequately washed hands and inappropriately disinfected medical devices. Most outbreaks are bacterial, viral or fungal. Many times they occur in conjunction with community epidemics that spread to health care facilities.

Some microbial agents are extremely hardy when deposited onto surfaces. These agents can remain viable for several days to weeks and even months on surfaces which accounts for the fact that items and equipment can play a significant role in their transmission. The consistent application of procedures for processing patient care devices, disinfection and cleaning of equipment and hand washing continue to be the cornerstone practices in safely protecting patients and staff.

Infection prevention and control experts generally agree that all reusable medical devices and equipment be reprocessed according to a designated disinfection classification. An assessment of each device should be performed and a disinfection classification determination be made based upon on the intended use of the device. Ideally all medical devices in a facility would then be categorized as *critical, semi-critical or non-critical.* Such designation will provide the guidance as to which reprocessing method or germicidal activity is appropriate for a particular device according to its intended use.

Classification scheme

The late Earl H. Spaulding, Ph.D. a renowned microbiologist, proposed three categories of medical devices based on the degree of risk of infection to the patient in their use. These categories have since been adopted by the Centers for Disease Control and Prevention (CDC) in their guideline for hand washing and hospital environmental control and in the Association for Professionals in Infection Control and Epidemiology Guideline for the Selection and Use of Disinfectants. The classification indicates the level of sterilization or disinfection required for various items based on their intended use.

In the Spaulding scheme, patient care items are identified as *critical, semi-critical or non-critical:*

- *Critical* devices require sterilization and should remain sterile up to their point of use. Such devices enter the bloodstream or normally sterile areas of the body. Needles, syringes, scalpels, invasive/ surgical instruments are examples of critical devices.

- *Semi-critical* devices generally require high-level disinfection (HLD). HLD is a unique process that utilizes a liquid sterilant with a shortened exposure time. Such devices are intended to make direct contact with mucous membranes. Gastro endoscopes, vaginal and rectal speculums and other similar devices are examples of semi-critical devices.

- *Non-critical* devices are instruments and medical equipment that generally make contact with intact skin or epithelial tissue. These devices do not necessarily need to make direct patient contact, but may themselves become a carrier or reservoir for infectious agents. Simple hand contact by medical personnel with these devices may lead to cross contamination between patients. A wide variety of equipment devices including respiratory therapy and anesthesia equipment surfaces, infant incubators, operating room tables and lights, ER and OR instrument stands, infusion pumps, portable heart monitors, slit lamps and other similar devices fall into this category.

In addition to the devices described in Spaulding's scheme, environmental surfaces in patient care areas have also been implicated in transmission of infectious agents. Examples include; Methicillin Resistant Staphylococcus

Aureus (MRSA), Clostridium difficile (c.diff.) and Klebsiella Pneumoniae- Carbapenem resistant (KPC). These can be found on the surfaces of bed rails, patient room doorknobs and other similar surfaces. Outbreaks have resulted from inadequate and infrequent cleaning and disinfection procedures.

The use of an EPA approved, tuberculocidal, intermediate hospital level disinfectant should be used according to product label instructions. The product should list on its label examples of the types of devices the product is approved for use on. Mixing homemade concoctions is strongly discouraged. Although inexpensive at first glance, the mixing of bleach and water or other similar mixtures, except under extraordinary circumstances, has turned into a nightmare in regards to equipment incompatibility. In addition, water quality plays an important role in the efficacy of a products antimicrobial activity. The end result is a higher cost in regards to equipment damage and the failure of some devices during subsequent use.

Reprocessing Medical Devices and Equipment

Confusion still exists regarding the terms "sterilization" and "disinfection". They do not have the same meaning.

Sterilization is an absolute state. It is defined as the complete and absolute absence of any living thing, including microbes. Sterilization of medical instruments and devices is normally accomplished in the health care facility by subjecting them to steam, ethylene oxide gas or to a FDA approved, liquid chemical sterilant such as a glutaraldehyde. This is a relatively complex subject in itself that is discussed in another paper.

Disinfection on the other hand is a process that eliminates or reduces the numbers of living microorganisms to a level that is appropriate for the use of that particular device. The basics when selecting a disinfectant for use on patient care equipment includes the following:

- The product should be EPA approved as a cleaner as well as a disinfectant.
- Ready to use products provide a wider range of safety than concentrates. Water quality and suspended particulates can interfere with the ability of a chemical to perform.
- It should effectively kill at a minimum; gram-positive bacteria, gram- negative bacteria, mycobacteria (TB), both enveloped and non-enveloped viruses and fungus. If any are missing from the product label the product fails the standard for use in health care facilities.
- It should list on its label the specific single contact time required to eliminate for all of the listed microorganisms inclusive. Products that list different contact times for various microbes are often too confusing and misused. The longest kill time listed on a label for any particular microorganism is the necessary contact time required for complete kill.
- It should be approved for use on both hard and soft surfaces. Compatibility with clear plastics, soft materials such as vinyl, and metals such as brass, aluminum, stainless steel and baked painted surfaces is paramount. Incompatibility issues can cause equipment to fail during use. In addition, it should leave no residual chemical on surfaces.
- It must be able to remain thoroughly wet on surfaces for the entire required contact time at room temperature. If the contact time listed is 5 minutes, the surface must remain wet for the full 5 minutes before being wiped off. Beware that some disinfectants with very short contact times may not be compatible with all surfaces. Products containing greater than 25% alcohol, phenol, hydrogen peroxide or bleach may damage some materials and have been known to cause equipment failure during use.
- In the US its label must display an EPA registration number and in Canada a Drug Identification Number (DIN) to comply with federal regulations. Additionally each state requires its own registration.

Anything less can put patients, healthcare professionals (and their family members at home) at risk of exposure to infectious agents.

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