

environmental services

Focus on Surface Disinfection When Fighting COVID-19

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The perfect disinfectant or product for healthcare disinfection has not been introduced; however, there is a wide array of excellent disinfectants that offer a range of characteristics. As of March 10, 2020, the US Centers for Disease Control and Prevention (CDC) recommendation on disinfectant products for COVID-19 is to use an Environmental Protection Agency-registered disinfectant on List N on the EPA website that has qualified under the EPA's emerging viral pathogens program for use against SARS-CoV-2.

The rationale for this recommendation is if disinfectants inactivate harder to inactivate microorganisms (e.g., mycobacteria, non-enveloped viruses) than coronaviruses, they should be expected to inactivate COVID-19. This logic is based on the recognition by the CDC and the EPA that certain microorganisms can be ranked with respect to their tolerance or resistance to chemical disinfectants (i.e., Spaulding classification model).

With this approach, the most susceptible to most resistant tiers of microorganisms are: lipid (i.e., enveloped) or medium-sized viruses (e.g., coronaviruses); vegetative bacteria (e.g., *S. aureus*); fungi (e.g., *Candida*, *Aspergillus*); non-lipid (i.e., non-enveloped) or small viruses (e.g., poliovirus, rhinovirus); mycobacteria (e.g., *M. tuberculosis*); coccidia (*Cryptosporidium*); and the most resistant, spores (e.g., *C. difficile*).

With this conservative approach, EPA divided the viruses into 3 subgroups based on size and type of virus: enveloped viruses (easiest to inactivate such as coronavirus); large (50-100nm) non-enveloped viruses (such as adenovirus and rotavirus, harder to inactivate than enveloped viruses); and small (<50nm) non-enveloped viruses

(hardest to inactivate such as rhinovirus). This hierarchy is used to determine a product's anticipated efficacy against an emerging viral pathogen.

SARS-CoV-2 is an enveloped virus and the easiest to inactivate of the 3 subgroups of viruses. Coronaviruses, such as SARS-CoV-2 and MERS-CoV, cause an acute respiratory illness in humans and are transmitted from animals to humans. Bats are likely the main mammalian reservoir.

Based on the EPA emerging viral pathogen criteria, an EPA-registered, hospital



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disinfectant must have a disinfectant efficacy claim against at least 1 small or 1 large non-enveloped virus to be eligible for use against an enveloped emerging viral pathogen. EPA's List N identifies which registered products have this designation on their Master Label.


Why does this matter? Over the past decade, there has been a growing appreciation that environmental contamination of hospital surfaces promotes infection transmission for many pathogens. Studies with epidemiologically important pathogens (e.g., MRSA, VRE, *C. difficile*) have shown that surfaces are contaminated and the frequency of hand contamination correlates to the frequency of environmental contamination.

While the level of surface contamination with COVID-19 is not known, studies with other epidemiologically important

pathogens have shown that disinfection leads to decreased transmission. Further, studies of coronaviruses have demonstrated that they may survive on surfaces for hours to days depending on temperature and humidity. Unfortunately, many studies have shown that disinfection of surfaces is suboptimal and effective disinfection requires not only an effective product but also, effective practice.

The combination of product and practice results in effective surface disinfection, including the reduction of risk via viral removal and/or inactivation of pathogens.

The criticality of practice is highlighted by studies that demonstrate surface contamination with epidemiologically-important pathogens is due to a failure to thoroughly disinfect surfaces rather than a faulty product. While there are many factors that could influence the efficacy of disinfection, the surface must be completely and thoroughly wiped with an adequate number of antimicrobial wipes effective against the target pathogen (or harder to inactivate microorganisms) and a contact time specified by the label instructions.

The transmission of viral respiratory pathogens such as COVID-19 can be minimized by thorough and complete application of an EPA-registered disinfectant per the manufacturer's instructions, that is included on EPA's List N, to surfaces as well as good personal hygiene, including hand hygiene, minimize contact with your face, and respiratory hygiene/cough etiquette. 

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