UV Light's Germicidal Properties Aid in Fight Against HAIs

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The germicidal properties of ultraviolet light are of renewed interest to clinicians wanting to employ technology in the fight against healthcare-acquired infections (HAIs). Essentially, ultraviolet light kills bacteria and viruses by damaging their nucleic acid, thus destroying their ability to replicate and cause disease. UV wavelengths, which range from 1 to 400nm, are beyond the range of visible light, and UV rays with wavelengths shorter than 300nm can kill pathogenic microorganisms. Most experts agree that the C bandwidth is the most germicidal, and that UVC light can remove approximately 99 percent of microbial contamination in the air and on surfaces. The energy required to kill microorganisms is a product of the UV light's intensity and exposure time, measured in micro-watt seconds per square centimeter. For example, to achieve a 99 percent kill rate, the following exposures are necessary:

• Aspergillus flavus: 60,000 mW S/cm2

• Rotavirus: 21,000 mW S/cm2

• **Hepatitis virus: 8,000 mW S/cm2**

• Salmonella enteritidis: 7,600 mW S/cm2

• E. coli: 7,000 mW S/cm2

• Influenza virus: 6,600 mW S/cm2

• Shigella dysenterie: 4,200 mW S/cm2

• Legionella pneumophila: 3,800 mW S/cm2

UVC light lends itself to numerous applications in the healthcare environment. It can be employed via fixtures for coil irradiation in HVAC systems; UVC air cleaners can be used for air-stream irradiation; fixed, portable and handheld UVC-emitting devices can be used for surface sterilization; and a combination of UVC air and surface sterilization devices can be used in operating rooms and other high-risk areas in the hospital. Air and surface sterilization using UVC light is differentiated by the amount of time during which microorganisms are exposed to UVC radiation. Surface contamination is fixed in nature, so less UVC intensity is required; however, because pathogens move much more swiftly in air streams, a much greater concentration of UVC light is required for microbial kill. Efficacious sterilization by UVC light is determined by light intensity, duration of exposure, and distance of the UVC light from the surface or the air stream.