**Panel IV: Building Environment and Using EM/Light – Overview & Best Practices and Use of Em/Light to Date, Gaps in Research**

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There is substantial evidence that environmental contamination leads to patient acquisition of multidrug-resistant organisms (MDROs) and improved cleaning/disinfection reduce healthcare-associated infections (HAIs): 1) Hospital room surfaces are frequently contaminated withMDROs; 2) MDROs survive days to months; 3) rooms frequently inadequately cleaned; 4) Rooms are frequently contaminated post-terminal disinfection; 5) disinfection reduces contamination; 6) improved terminal disinfection reduces HAIs; 6) enhanced terminal disinfection (e.g., UV-C devices) reduces risk of MDR colonization/infection in subsequent patient admitted to the room; 7) enhanced terminal disinfection of rooms with a colonized or infected patient may lead to hospital-wide decrease in HAIs.

Ultraviolent light (UV) light is now widely used for terminal room decontamination of hospital rooms. Most devices use UV-C irradiation with a wavelength of 254nm. Advantages of UV devices for terminal room disinfection include the following: 1) reliable biocidal activity against a wide range of pathogens; 2) surfaces and equipment decontaminated; 3) demonstrated effectiveness to reduce healthcare associated infections (HAIs) in before-after studies and randomized clinical trial; and, 4) residual free and does not give rise to health and safety concerns. Limitations for using UV for terminal room disinfection include: 1) can only be done for terminal disinfection; 2) all patients and staff must be removed from room; 3) requires 5-15 min for killing of vegetative bacteria and 10-45 min for inactivation of spores (e.g., *C. difficile*); 4) requires direct or indirect line of sight for microbial inactivation; 5) substantial capital equipment costs; and 6) does not remove dust and stains which are important to patients/visitors.

Multiple clinical trials have demonstrated that use of a UV room disinfection device following standard cleaning/chemical disinfection of rooms that housed a patient with an MDRO results in a lowered risk of a subsequent occupant to develop colonization or infection with the MDRO and may lead to a hospital-wide decrease in MDROs. Although most study used a before-after design and did not determine that there was no change in hand hygiene and room cleaning compliance some studies have assessed hand hygiene and cleaning compliance and used a more sophisticated design (e.g., prospective cohort or randomized clinical trial).

Future research using UV room disinfection devices should focus on the following: 1) demonstrate overall hospital reduction in HAIs by using UV devices for patients on contact precautions (e.g., CRE); 2) assess effectiveness of room disinfection units when used for terminal disinfection of all patients (not just those on contact isolation); 3) assess effectiveness in other settings (e.g., nursing homes, day care centers, veterinary hospitals, etc.)

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