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Ultraviolet Dosage And Decontamination Efficacy Was Widely Variable Across 14 Uv Devices After Testing A Dried Enveloped Ribonucleic Acid Virus Surrogate For Sars-cov-2

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Aims: The dosages and efficacy of 14 ultraviolet (UV) decontamination technologies were measured against a SARS-CoV-2 surrogate virus that was dried on to different materials for lab and field testing.

Methods and Results: A live enveloped, ribonucleic acid virus surrogate for SARS-CoV-2 was dried on stainless steel 304 (SS304), Navy Top Coat-painted SS304 (NTC), cardboard, polyurethane, polymethyl methacrylate (PMMA), and acrylonitrile butadiene styrene (ABS) at > 8.0 log10 plaque-forming units (PFU) per test coupon. The coupons were then exposed to UV light during both lab and field testing. Commercial and prototype UV-emitting devices were measured for efficacy; 4 handheld devices, 3 room/surface-disinfecting machines, 5 air-disinfection devices, and 2 larger custom-made machines. UV device dosages ranged from 0.01-729 mJ cm-2. Anti-viral efficacy among the different UV devices ranged from no decontamination up to nearly achieving sterilization. Importantly, cardboard required far more dosage than SS304.

Conclusions: Enormous variability in dosage and efficacy was measured among the different UV devices. Porous materials limit the utility of UV decontamination.

Significance and Impact of the Study: UV devices have wide variability in dosages, efficacy, hazards, and UV output over time indicating that each UV device needs independent technical measurement and assessment for product development, prior to and during use.

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