5/2/17

Independent Comparative Study Conducted by University of Iowa Hospitals & Clinics on our TURBO-UV

Colleagues,

We know that Ultraviolet Germicidal Irradiation (UVGI) works under the right circumstances on viruses, bacteria and spores. The right total dose of UV-C will destroy the bonds between the amino acids in the organism's DNA, rendering it unable to replicate and thus produce illness in the human host. The effectiveness of UVGI is dependent on intensity, distance and time. What must also be considered is if the organism's DNA is being shielded inside a biofilm…blood, vomitus, diarrhea, etc. making it difficult for UV-C to penetrate to the DNA. That's why UVGI is considered a terminal cleaning intervention only, you must still do thorough mechanical/chemical disinfection first.

With the assistance of Dr. Vincent Masse, an Infectious Disease physician from Canada that is here at UIHC doing a year-long fellowship in Epi, I've completed UV-C radiometer evaluation of the UV-C products we've been discussing: The "Lumalier ED-435" also known as "baby Tru-D" that we use currently (cost $**4,000** ea.); the new **MRSA-UV's "Turbo-UV"** device, (cost $**595**).

We've done testing in our SIU, in a standard carpeted office and in a JCAS ambulance. We did a side-by-side comparison of both units in our SIU at 5ft and 10 ft. radius from our radiometer sensor.

The energy dose needed to destroy the bonds in the DNA is measured in total microjoules of exposure.

Total Dose needed to kill E. Coli - 6,600 microjoules; to kill Influenza A - 6,600 microjoules; to kill HIV - 36,000 microjoules; to kill Hepatitis - 8,000 microjoules; to kill C. Diff - 38,500 microjoules

Results: (on the displays below, move the decimal to the right three places to get "microjoules" per second. Multiply x60 to get the total dose accumulated per minute.

- The photos below tell the story at 5ft. from the radiometer sensor. (effectively a 10ft. diameter circle around the device).
- The "**Turbo-UV**" is providing **83** microjoules per second, or 4,980 microjoules per minute**. Run it for a bit over 7 minutes and you kill C. Diff. (at a 10' diameter around the Turbo unit.)**
- The Lumalier is providing 71 microjoules per second…essentially the same, 4,260 microjoules per minute.
- At 10 ft. away, both device's output dropped to 28 and 26 microjoules respectively, so exposure time would have to be increased to achieve a killing dose in a 20ft. diameter circle (not ideal).
- Centered inside a JCAS ambulance, we measured in the same dose range as the above within 5 ft.; measured down the tunnel to the front cab and it dropped to 38 microjoules. By opening cabinet #3 above the attendant's chair, we measured 28 microjoules inside of the cabinet (not bad). **Thus, if you routinely ran this for 10-15 min. per session, it should be doing a pretty good job inside of an ambulance. Perhaps as a daily routine?**

Conclusion:

These **MRSA-UV.com** **"Turbo-UV"** devices work for smaller spaces. They are essentially equivalent to the Lumalier units we have now but at a substantially lower cost. A nice feature is that they have a remote to run them from up to 30ft. away.

Note: The durability of the Turbo device is fine and bulb replacement after 10,000 hours is only $55. You can't drop either of these devices, you have to handle them carefully. Safety is a primary concern, UV-C can harm your eyes and skin if exposed…PPE is advised.

My recommendation: These are a worthwhile investment. UIHC would love to have 4 for our SIU and another radiometer if possible, if the coalition choses to move forward.

Thanks to Johnson Co. Public Health and the coalition for enabling us to scientifically evaluate these devices!
MJH

Note: Readings are displayed in millijoules. Must move decimal over 3 places to the right to convert to microjoules.

Additional comments:

- UV-C radiation is not visible to the human eye, but is still essentially light energy. As such, shadows present a significant problem.
- Some devices count on "reflection" or bounce of the UV-C light energy to hit shadows indirectly at a reduced dose. Increasing the dosage and/or exposure time can help, assuming you're getting some reflection. However…
- Standard painted walls absorb 95%+ of UV-C energy…very little reflection if any.
- Lumacept® wall paint offered by the Tru-D people can enhance the reflectivity of the surface significantly, but costs $300/gallon, (we did our SIU patient rooms, anterooms and autoclave room this past December).
- The wall paint works, shortened our big Tru-D device- calculated UVGI treatment time in our unit patient rooms from 40 min. to 13 min.
- Using more than one device, depending on the size of the room, can also help with the shadow issue.
- One comment about UVGI in room air…we did not add UVGI to our negative pressure exhaust system during our unit renovation in December per the guidance of Univ. of NE BCU. They had it, but pulled it out after studies showed that UVGI has little effectiveness treating moving air and wasn't worth the expense and maintenance.

There is a multi-center study published that showed it lowered the risk of hospital acquired infections. UVGI is another tool in the kit that works, but has its limitations. It is a worthwhile investment when done prudently and thoughtfully applied.

FYI - University of Iowa Hospitals & Clinics just received notice this week (**2/15/18**) from the **international journal, Antimicrobial Resistance & Infection Control** (ARIC) based in The Netherlands that their manuscript has passed peer/editorial review and has been accepted for publication. The title is: "***Comparing and Optimizing Ultraviolet Germicidal Irradiation Systems Use for Patient Room Terminal Disinfection: An Exploratory Study Using Radiometry and Commercial Test Cards***" (ARIC-D-17-00289R1). This study will be published in the very near future.

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