Ultraviolet Irradiation

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Three modalities for routine disinfection of hard surfaces in patient rooms:

- Chemical disinfectants
- Self-disinfecting surfaces
- No-touch technologies:
  - Ultraviolet Light
  - Hydrogen Peroxide-Producing Systems
What is Ultraviolet (UV) Light?

- Ultraviolet (UV) light is a form of light that is invisible to the human eye.
- It occupies the portion of the electromagnetic spectrum between X-rays and visible light.
- The sun emits ultraviolet light; however, much of it is absorbed by the earth’s ozone layer.
What is Ultraviolet (UV) Light?

Ultraviolet light is invisible to the human eye but can be used to disinfect microorganisms including chlorine-resistant protozoa.
Ultraviolet Germicidal Irradiation (UVGI)

- Disinfection method that uses short-wavelength ultraviolet (UV-C) light to kill or inactivate microorganisms.

- Works by destroying nucleic acids and disrupting their DNA, leaving them unable to perform vital cellular functions.

- UVGI is used in a variety of applications, such as food, air, and water purification.
Large Randomized Trial Led by Duke Health

Enhanced terminal room disinfection and acquisition and infection caused by multidrug-resistant organisms and Clostridium difficile (the Benefits of Enhanced Terminal Room Disinfection study): a cluster-randomised, multicentre, crossover study. *The Lancet*, 2017; DOI: 10.1016/S0140-6736(16)31588-4
What might this be used for?
Effectively disinfects cell phones in 10 minutes...
Far ultraviolet C (far-UVC) light

- Can kill airborne flu viruses without harming human tissues.
- Overhead far-UVC light in hospitals, doctors' offices, schools, airports, airplanes, and other public spaces could provide a powerful check on seasonal influenza epidemics, as well as influenza pandemics. (According to study at the Center for Radiological Research Far-UVC light: A new tool to control the spread of airborne-mediated microbial diseases. Feb 2018)
Far-UV Light in an Airport
To give you an idea...

<table>
<thead>
<tr>
<th>Ultraviolet Class</th>
<th>Type (Prefix)</th>
<th>Wavelength Range</th>
<th>Frequency Range</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ultraviolet A</td>
<td>UVA</td>
<td>315–400</td>
<td>3.10–3.94</td>
<td>Long-wave, black light, not absorbed by the ozone layer</td>
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<td>0.497–0.631</td>
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<td>3.94–4.43</td>
<td>Medium-wave, mostly absorbed by the ozone layer</td>
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<td>0.631–0.710</td>
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<td></td>
<td>6.20–12.4</td>
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<td>0.993–1.987</td>
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<tr>
<td>Far ultraviolet</td>
<td>FUV</td>
<td>122–200</td>
<td></td>
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<tr>
<td>Short-wavelength UVC</td>
<td>(Germicidal UV)</td>
<td>260–270</td>
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</table>
Closer to home – Vancouver Coastal Health

• There was a study conducted in BC that compared the decontamination of UVC light vs chemical measures.
M20 UVC Disinfection Device
MoonbeamTM3

Xenex Disinfection UV Robot

https://www.xenex.com/our-science
Disadvantages

- Requires room to be vacated & disinfected
- Used only in terminal cleaning
- Positioning of equipment & furniture
- Turnaround time
- Cost
Adjunct to Current RP

- Stringent hand-washing.
- Precautions for staff contact with infected patients.
- Prudent use of antibiotics in patients.
Cost-Benefit Ratio

- Expense of UV Units
- Expense of treating nosocomial infections
Any Questions or Comments?
References

- http://hospitalnews.com/waging-war-infections/
- https://infectioncontrol.tips/2016/01/21/1423/
References

Thank-you! 😊