1. What is the consensus of using ultraviolet light in filtration of air handlers?
   a. Michael: UV at air handlers are known to be effective at reducing contaminant build up ON THE COIL but we don’t believe that UV is a useful or effective action to kill COVID that may be transmitted to the air handler. Generally, we expect that the likelihood and probability of COVID airborne particles getting all the way back to the air handler are low.

2. Would providing UV lamp at the supply air stream be effective to kill the COVID-19 virus?
   a. See above.

3. Wonder if you could mention/provide the test method used for evaluating disinfectant on surfaces. I am curious to learn the correct way of testing a flooring product?
   a. Debra: In the materials study testing the disinfectant we will be using a method similar to the slide comparing SARS-CoV1 to SARS-CoV-2, inoculating the materials with a known amount of the virus and then culturing them, then testing on the time lines discussed to determine how long the virus remains viable and how long before the tested product kills the virus on each type of material.

4. Comment regarding HEPA filters and virus size - what about aerosol transmission, not in droplets?
   a. Michael: Remember that a HEPA filter is a compilation of multiple layers of material, creating a highly circuitous path, and becomes more effective as it loads up. We believe it is an easily deployed and effective method of capture of airborne contaminants including airborne COVID.

5. In your view, what proportion of infections is from fomite contact versus inhalation of airborne respirable droplets?
   a. We do not have adequate data to answer at this time.

6. HEPA Filtration is current highest level we typically utilize in healthcare facilities, however there are products on the market such as a Molekule with use a different technology (Photo Electrochemical Oxidation).
   1. Is this technology proven or capable to be used for larger applications?
   2. Is this technology really able to better HEPA filtration, in other words does the science support?
   a. Michael: Great question.
1. Molekule still uses HEPA in order to capture contaminants, it simply uses ECO in order to “kill” contaminants on the filter. BiPolar Ion Oxidation is another method by creating charged ions in the air which cause particles to attach to them and aggregate, causing it to fall to surfaces for cleaning or making easier for a filter to capture.

2. They should be viewed as supplemental strategies.

7. The discussion has been about a patient room, not an open arena, as the USACE is constructing. How might you advise HVAC infection prevention in an open environment?
   a. Michael: Different approaches for different needs. Most instances to serve COVID have used isolation pods, separate areas with HEPA exhausted air in order to safely house and segregate patients. Additionally, the total air balance in these open spaces is adjusted to be negative relative to concourse areas.

8. Are vinyl coated fabrics not considered durable coated textiles?
   a. Debra: Yes, vinyl coated fabrics are in the family of durable coated textiles. However, all durable coated textiles are not coated with vinyl. There are other products used (see the slide for a list).

9. COVID patients likely soon will be/are dying at home without ever seeing a healthcare facility (possibly in large numbers) creating a potentially significant Community Spread risk - is this being considered by any public health stakeholder community? Can any panelists address? CleanHealth Environmental may have a lot to add here given the company’s DNA.
   a. Debra: COVID-19 is clearly a community disease; however, I am not sure the data is known to determine how non-hospital deaths are being counted. I think we are in the early time when many questions will have to wait on better data.
   b. Shari: From a cleaning and disinfection perspective, SARS-CoV-2 is considered a community-acquired infection as well as a healthcare-associated infection. Therefore, disinfection will need to be of more focus in both community facilities and in the home. Cleaning staff will need to have a better understanding and training of infection prevention measures as well as their own worker protection when disinfecting community and home environments. It’s not primarily about aesthetics anymore but having a clear understanding of the role cleaning professionals play in infection prevention.

10. I have heard that silver integrated into materials works as a disinfectant. Is there a potential for building that into more surfaces and cushions materials?
    a. Debra: Yes, I think that we are facing a time when innovation of new materials and uses of known materials with active properties of disinfection will be addressed. It is not an easy process but may be well worth it.

11. It seems that the coated fabrics market (vinyl) has been pushed toward anti-microbial free materials. Even though vinyl is the easiest upholstery product to disinfect do you see the trend continuing toward anti-microbial free surface materials?
    a. Debra: I think it speaks to the need for better testing to determine if products can get the same outcome without including anti-microbials. It is a risk/reward proposition and there is probably more than one viable solution.

12. What are the research findings (if any) specifically dealing with a psychiatric hospital population? When dealing with OHM requirements and the restrictions with materials/products allowed to be utilized in such spaces?
    a. Debra: I am not aware of research findings specific to psychiatric hospital materials and products.

13. In Debra’s presentation, the slide said heavy metals act as antimicrobials in materials like textiles and can destroy microorganisms at the cellular level. It was my understanding the antimicrobials like silver in fabric slow the growth but don’t actually destroy. Would like clarification. Over the past few years,
antimicrobials are being removed from textiles with concerns over super bugs. Do antimicrobials have impact on the virus?

a. Debra: For a heavy metal to kill pathogens, it must come into direct contact. When silver was added to textiles, it did not necessarily address that issue. Therefore, it was likely to reduce/destroy pathogens based on the contact. There have been recent concerns related to whether heavy metals may contribute to the development of resistant pathogens. There are a few studies that have looked at that, but I do not know of any that can declare that copper, for instance, contributes to resistant strains of pathogens. I am sure there will be more studies to evaluate and may change the value proposition.

14. I am on a hospital project currently that has a new building construction connected to the existing hospital. The new wing has been built and is almost ready for occupancy. The next phase involves demolition of the existing hospital building where coronavirus patients have been. What would be the best way to disinfect the building prior to demolition? For example specifically, existing HVAC, sanitary piping, etc.

a. Michael: ASHE is developing some guidance around this issue (disinfection of existing systems) so please check their website in the next week or so.

15. How are you defining soft surfaces - Shari’s comment about Sanitizing vs. Disinfecting?

a. Debra: a soft surface may be a textile (woven or nonwoven), carpet and carpet-like products that don’t want to be called carpet. I hope that new disinfecting products as they come on the market will provide a better solution than we currently have regarding soft surfaces.

b. Shari: Soft surfaces are defined as porous materials such as privacy curtains, couches, and chairs, including upholstered fabrics. Unlike hard surface disinfectant claims, soft surface claims are limited by the EPA, to “sanitizer” versus “disinfectant” claims. The efficacy of a chemical used for sanitizing or disinfection depends on its ability to reduce the contamination level.

16. Some local “health food type” stores and websites (e.g., Kangen) are offering acidic water (2.5 pH) as a more natural hand and surface disinfectant. I can’t find much information online regarding its efficacy. Can you speak to this potential, or lack thereof?

a. Debra: Acidic water is corrosive and would be damaging to materials over time. I imagine that it would be hard on hands as well. I believe that 7 is neutral with a range of 0-14. Many textiles require pH of water used in laundering or cleaning to be between 6.5 and 10.5.

17. Is an open window in a room a good solution for circulation?

a. Shari: In regards to cleaning and disinfection, in accordance with the CDC Environmental Cleaning & Disinfection Interim Recommendations for U.S. Community Facilities with Suspected/Confirmed Coronavirus Disease 2019 (COVID-19) for facilities that do not house people overnight, CDC recommends opening outside doors and windows and using ventilating fans to increase air circulation in the area.

18. What is DPH?

a. Jane: I think this was Department of Health - as don’t think that I referenced DPH - DOH - would be the Department of Health - regulatory-wise - use the FGI Guidelines as licensing code in many states - usually the Department of Health regulates hospitals and nursing homes.

19. Is there a sense of humidity and the ability for the virus droplets to be able to move in the air?

a. Michael: While these are two different factors, as you heard during the presentation, it is theorized that higher relative humidity may help break down the virus more readily. Thus in lower humidity, there may be more opportunity for the virus to remain suspended airborne. Beyond that, virus droplets in the air may drop onto surfaces thus the importance of cleaning and disinfecting, or remain suspended as aerosolized material. In those instances, either it is diluted by air changes in the space, captured by filtration or exhausted. It may also settle onto the supply (via the normal re-entrainment of air of a mixing diffuser) or return grille, so these should be treated carefully by EVS as well.
20. Does COVID-19 last longer on dirty surfaces? When you state the virus only lasts 24 hours on cardboard, if the cardboard is dirty or wet, does COVID last longer?
   a. Debra: Dirt and debris provide resources for pathogens to survive. In a lab study where there is no soil added, the pathogen will expire more quickly.

21. Do you see a need for actual mobile units (double expandable trailers) that would be needed to go out into the smaller communities? If so, what do you feel the requirements would be?
   a. Michael: We might expect that the need would be for ICU stations with accompanying infrastructure, equipment and staff.
   b. Jane: I think the opportunity to have mobile units available for smaller and rural communities is a good idea. A number of years ago, mobile units were evaluated as an opportunity to provide specialized care in rural areas – such as OB/GYN services one week and pediatric care the next week, etc. Utilizing mobile units that could then come together in case of a larger emergency or natural disaster has been thought of as one solution to meet surge demands in smaller and rural communities that can often be underserved when a larger event occurs – i.e. pandemic and/or natural disaster. The premise being that multiple mobile units are brought together to create a larger facility. The FGI has requirements for mobile units in the 2018 guidelines and revisions will be provided in the 2022 guidelines publication.

22. Electrostatic sprayers and foggers seem to be a trendy way to apply chemical disinfectants to surfaces. Can you comment on the use of those and is there still a role for wiping surfaces clean after using those?
   a. Debra: If the chemical product leaves a residue, then there is a role for wiping surfaces. Some of these products remain active for up to 24 hours, so the longer it can be on a surface, the better, however if you are performing terminal cleaning on a hospital room and have to prepare for a new patient, then dwelling time becomes pathogen specific and wiping it down becomes a necessary step.
   b. Shari: Using electrostatic sprayers is a great application method for chemical disinfectants. However, the area must first be manually cleaned of both visible and non-visible soil (such as blood, protein substances, and other debris)! In regards to wiping the surface following the application of the disinfectant, the label is the law!!! A number different disinfectants may be applied with an electrostatic sprayer. The wiping instructions will depend on the chemical disinfectant used. It is important to note that the individual applying the disinfectant must be properly protected. The instructions for use of that specific disinfectant, based on the application method, will prescribe the required personal protective equipment (PPE). Again, the label is the law.

23. In the event of converting spaces such as hotel rooms into patient rooms and portable HEPA filters going into every room with 12 air changes per hour - where does your makeup air come from? Should we automatically consider a new penetration in the exterior wall for makeup air, or can the normal PTAC/VTAC units in those kinds of spaces generally be adapted to the increased intake? What about at sites where significant heating or cooling is required?
   a. Michael: We can imagine it will influence owner decision making in future yes.

24. From a whole-building-design perspective, do you feel that this will influence the way we think of return air plenums, air handling units, and air exchanges in general?
   a. Michael: We can imagine it will influence owner decision making in the future yes.
   b. Jane: Yes – I think that we would look at zones differently - and particularly as stated above evaluation of alternatives to PTAC/VTAC units - for better systems that protect residents more efficiently and provide safer environments. The topics addressed in the question, will definitely become part of the discussions at ASHRAE 170 and impact mechanical codes in the future.

25. For this triage .... could poss. have an area incorporated into a design as a what if scenario .... so local & State AHJ's have on record such an area of construction (or future/temp construction) ... Is this something that was considered?
a. Michael: Will let Jane offer her perspective as an architect but we expect that many owners will be challenged to maintain this triage space as it creates patient flow limitations, drop-off limitations, etc. - but that they might explore further options in order to integrate such space into their ED and their existing waiting area.

b. Jane: Thanks, Michael - I think that the design of the ED will change as a result. We have seen this with “active shooter” evaluations and “behavioral health” evaluations - by providing areas that allow for pre-assessment or triage prior to bringing a patient into an ED. I think this will be true for potential testing of pathogens, too. The implementation is not clear - but the concern will be part of the safety risk assessment process and a plan/procedure coupled with changes in the physical environment will be part of the design process - and potentially screenings, depending upon the efficiency and efficacy of testing, could occur prior to the acceptance of a patient in an ED. The result could be additional isolation rooms in the ED and separation of waiting areas for those testing positive or of concern based upon symptoms. Evaluation of all of these ideas will need to be vetted and discussed based upon the experience and challenges faced within existing settings as part of post-occupancy review and safety risk assessments of the future.

26. What advice can be offered to manufacturers who are being prompted to innovate, who then observe some resistance from architects, designers, engineers and consultants? The resistance which is a result of a lack of direction, prescription or guidance on the subject because the proposed solutions are novel and outside of that which is defined in AHCA, FGI, ETC.

a. Debra: Often, the cycle of innovation and development may be a 15 year cycle. We do not necessarily have 15 years (in the same way we don’t have years to wait on a FDA solution for medical treatment). True innovators are comfortable in the face of resistance. We do not need a prescription, but those willing to try new things. Some of the products I am testing - we have to develop the tests because the potential of the product is beyond what is on the market right now. I think environmental surface materials innovation may face similar obstacles. But I bet it will be worth it.

b. Shari: Published studies and data are key. As we recognize, healthcare responds to data.