Research to Action:

Building Health for All® in the Face of COVID-19

CHAPTER 1

Leveraging Buildings to Mitigate Viral Transmission

CENTER FOR ACTIVE DESIGN®

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In the face of COVID-19, real estate professionals, designers, and other decision makers are urgently requesting guidance on how to adapt their projects and portfolios to respond to the unique challenges presented by the pandemic. The Center for Active Design has prepared the following content to respond to this demand, using the best available evidence to date.

As the scientific evidence base around COVID-19 continues to evolve, we will update this material periodically to reflect emerging findings. Your feedback is appreciated—please reach out to *covid19@fitwel.org* with comments, questions, and insights for future updates.

Research to Action:

Building Health for All® in the Face of COVID-19

The global spread of COVID-19 has heightened awareness of the pressing importance of Fitwel's mission of building health for all. With people around the world spending an increasing amount of time indoors and in their local neighborhoods, the spaces where we live, work, study, and play have shifted dramatically. As we move through our collective response to COVID-19 and begin to recover, a new normal will emerge to create a more resilient society—and the buildings and public places we inhabit will play a critical role in this shift.

At the Center for Active Design, we are committed to ensuring our users and community have access to up-to-date resources that directly reflect the latest available health evidence. As part of this effort we will be sharing a series of resources to help guide building owners, property managers, designers, and employers as they respond to COVID-19 now and into the future. The five resources will focus on the following topics:

1. **Leveraging Buildings to Mitigate Viral Transmission.** This resource will provide an overview of the basics of viral transmission, as well as strategies to mitigate transmission—including limiting physical interactions, handwashing, regular cleaning, ventilation, filtration, and humidity.
2. **Building Trust in the Workplace.** This resource will provide guidance for cultivating employee and tenant trust, and enhancing perceptions of safety once office buildings are ready to re-open. We will cover topics, including but not limited to, emergency preparedness, communication, surveying, and signage.
3. **Mental Health and COVID-19.** This resource will focus on the importance of considering mental health during crises, and how home and workplace environments can be optimized to promote feelings of well-being. Strategies covered will include greenery, outdoor spaces, high quality indoor air, sleep environments, daylight, and views of nature.
4. **Density and Resiliency.** This resource will focus on how density can contribute to resiliency and public health, concentrating on a number of areas, including energy savings, affordable housing, diversity, public transit, sustainability, active transportation, and healthcare.
5. **Chronic Disease, Equity, and COVID-19.** This resource will explore the interconnected relationships between COVID-19, the social determinants of health, and chronic disease. Topics covered will include healthcare access, food access, housing quality, job role s, among others. This resource will also dig into specific strategies that can help address many of the inequities associated with negative COVID-19 outcomes, such as pollution, food environments, access to outdoor space, and community resiliency.

These resources are designed to contribute to an ever-evolving conversation, and we will stay abreast of new science as the research base expands. We are all in this together, and we look forward to continued collaboration to discover the best ways to meet the challenge of COVID-19.

CHAPTER 1

Leveraging Buildings to Mitigate Viral Transmission

While buildings alone cannot solve the COVID-19 crisis, there are several tangible tactics that building owners, managers, and employers can implement to reduce viral transmission and support the fight against this pandemic.

As the research community continues to study COVID-19, new evidence is constantly emerging. Many of the studies below report findings from the SARS and H1N1 outbreaks. These findings have guided our response, which will continue to evolve as we learn more about COVID-19 in the coming weeks, months, and years ahead.

This resource compiles relevant research findings, and highlights how the Fitwel Certification System can be applied to address health concerns associated with COVID-19. The goal is to provide actors across the real estate industry with vital information to guide and support changes being made in response to COVID-19.

Basics of Transmission

First, it is critical to understand the basics of what we know as of April 2020 about transmission of COVID-19. The types of transmission are ordered based on relevancy according to available research.

Person-to-Person Transmission

The SARS-CoV-2 virus, which is the cause of COVID-19, is believed to mainly spread through person-to-person transmission via respiratory droplets.[1] This type of spread is also referred to as large droplet transmission, which occurs when infective droplets travel from an infected individual to someone who is within 1 meter (≈ 3 feet). While the World Health Organization (WHO) recommends maintaining 3 feet distance from others, the Centers for Disease Control and Prevention (CDC) advises staying at least 6 feet away from other people.[2,3] The reason behind these differences has to do with uncertainty about how far the virus can travel when a person coughs, sneezes, or speaks. What we do know is that large droplets cannot remain suspended in the air because of their weight, meaning they either drop to the ground, land on a person, or onto another nearby surface.

Research suggests that COVID-19 can be transmitted through large droplets produced via coughing and sneezing of symptomatic individuals, as well as of those who are asymptomatic.[4]

Strategies for limiting large droplet transmission within buildings include sick leave, handwashing, regular cleaning, social distancing, and mask-wearing.

Larger droplets (>5 μm) fall to the ground relatively quickly, remain in the air for only a short amount of time, and can only be transmitted short distances.

Source: Tang, J. W., et al. (2006). Factors involved in the aerosol transmission of infection and control of ventilation in healthcare premises. Journal of Hospital Infection, 64, 100-114.

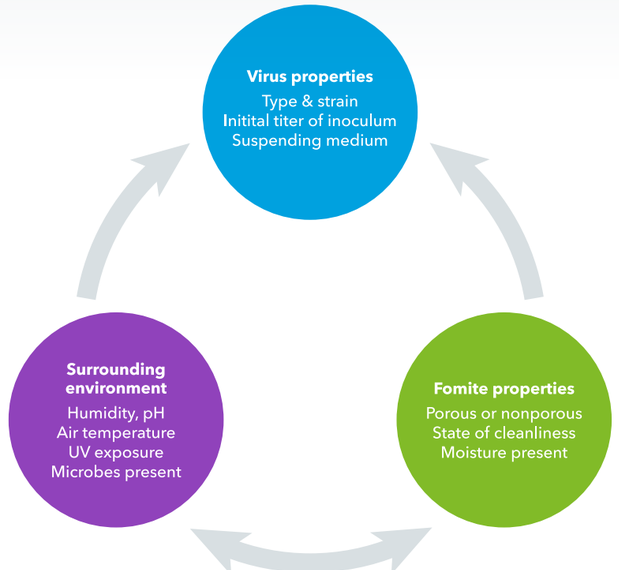
Surface-to-Person Transmission

Surface-to-person transmission, also known as "Fomite Transmission" occurs when a person touches a surface where large droplets of the virus have landed, and then touches their mouth, nose, or eyes. A "fomite" is an object or surface that can carry an infection. A fomite can be a piece of clothing, a door handle, a countertop, or a subway pole. Fomite transmission is a type of large droplet transmission in that when an infected individual talks, sneezes, coughs, or vomits nearby surfaces can become contaminated by large droplets that fall from the air. Fomite transmission can also potentially occur via contact with an airborne virus that settles after disturbance of a contaminated fomite, such as shaking a contaminated blanket.[5] When it comes to COVID-19, we are still learning how long the virus can last, and it appears to vary by material. A recent study from the New England Journal of Medicine (NEJM) found that the virus remained viable for much longer on plastic and stainless steel than on copper and cardboard.[6]

It is important to note that just because a viable virus may transfer from an object to a human, this does not mean that the dose is large enough to be infectious. The viral concentration decreases rapidly, with the half-life on stainless steel being 5.6 hours, and the half-life on plastic being 6.8 hours.[7]

Strategies for limiting fomite transmission within buildings include increasing humidity, regular cleaning, and handwashing.

VIRUS SURVIVAL ON FOMITE



Virus survival on fomites is influenced by factors including virus properties, fomite properties, and conditions within the surrounding environment.

Source: Boone, S. A, & Gerba, C. P. (2007). Significant of fomites in the spread of respiratory and enteric viral disease. Applied and Environmental Microbiology, 73, 1687-1696.

Aerosol Transmission

Aerosol transmission of a virus occurs when small droplets that are ≤5 µm in diameter, also known as droplet nuclei containing the virus travel further than 1 meter through the air. Long-range airborne transmission is only possible when the droplets of infectious material are small enough to remain airborne and be transmitted over long distances. Research has not been conclusive on whether COVID-19 can be transmitted via airborne transmission, but recent articles do indicate that there is a potential risk of aerosol transmission.

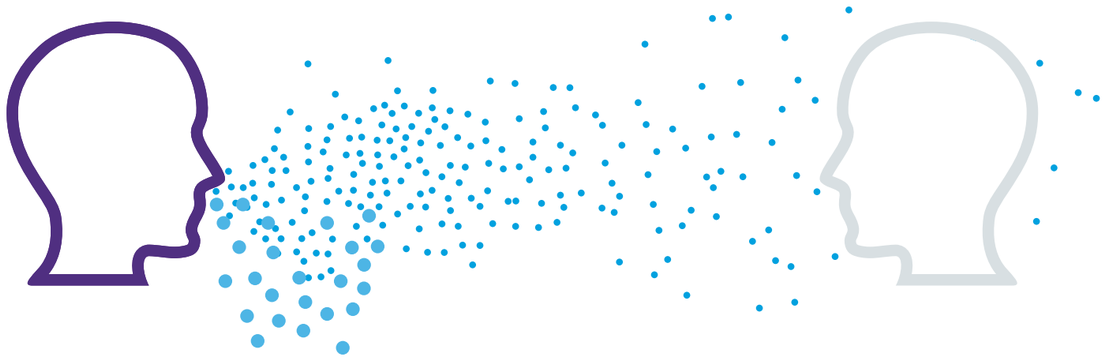
One study, looking at the presence of SARS-CoV-2 (the virus that causes COVID-19) in aerosols in two Wuhan hospitals during the height of the COVID-19 outbreak, found airborne viral RNA in a variety of areas, with higher levels detected in highly trafficked and unventilated spaces, patients' toilet areas, and medical staff areas. The results indicate the importance of room ventilation, open space, and disinfection. One area this article does not address is infectivity of the aerosolized virus, meaning there is uncertainty about whether the dose in the air found in these specific places is enough to cause a COVID-19 infection in another individual.[8]

Another study published by the New England Journal of Medicine also suggested the possibility of airborne transmission,[9] but according to the World Health Organization (WHO), it is worth noting that in the study, the aerosols were generated by a very powerful machine in a controlled laboratory setting, which does not mirror what would happen if a human cough or sneeze in an unregulated setting.[10] Finally, a third study, published in March found no detectable SARS-CoV-2 RNA in the air samples collected in a COVID-19 patient's hospital room.[11]

For more information and guidance on the basics of viral transmission, visit the CDC and the WHO.

While research has not been conclusive, the WHO recommends taking precautions aimed at mitigating aerosol transmission, especially in medical settings, as we continue to learn more about this virus.[12]

Strategies to limit airborne transmission within buildings include ventilation, humidity, and filtration.



Small droplets (≤5 µm) spread through air as a cloud, remain in the air for long periods of time, and can be carried long distances.

Source: Tang, J. W., et al. (2006). Factors involved in the aerosol transmission of infection and control of ventilation in healthcare premises. Journal of Hospital Infection, 64, 100-114.

Strategies that Mitigate Viral Transmission

There is no denying that our environment is connected to the spread of COVID-19. The strategies listed below provide several ways that the design and operations within buildings can be optimized to slow viral transmission rates. The strategies listed below are ordered based on strength of evidence and predicted impact.

Limit Physical Interactions

Associated with diminished risk of person-to-person transmission

While we don't know exactly how many lives social distancing has saved, we have all become extremely familiar with images describing the flattening of the curve, and understand the impact limiting physical interaction can have on the spread of COVID-19. According to modeling by Stanford University, if controls are lifted too quickly a resurgence could occur, and if populations resume business as usual at any point through December 2020, there is a risk of a spread that overwhelms hospital capacity.[13]

This means that even as workplaces begin to reopen, some level of physical distancing will be essential. While workplaces will never be able to completely remove infection risk, there are many policies that can help support employees as they strive to limit physical interactions. Most of our data around workplace infection at this point is in response to influenza. A literature review article estimates that on average, 16% of influenza transmission occurs in the workplace each year.[14] There are many steps employers can take to limit the spread of viral infections within the workplace.

At its core, social distancing is about limiting physical interactions to diminish risk of exposure. For those able to support remote work, establish staggered schedules where employees are able to telework several days a week, to help them avoid commutes and in-person interactions. Managers should coordinate with employees to ensure they are comfortable working remotely and have spaces where they are able to work safely and productively.

It will also be important for employers to support workers staying home when exhibiting COVID-19 symptoms or when around someone exhibiting symptoms. This means that paid sick leave is vital. One study found that universal paid sick days reduced workplace infections by 5.86%. In addition, providing 1 or 2 paid sick days specifically for the flu reduced workplace infections by 25.33% and 39.22%, respectively.[15]

While more research is certainly needed, providing PPE to employees who work in close quarters or in maintenance and custodial roles may also be beneficial when it comes to mitigating transmission within workplace settings.[16]

We are still learning more about the exact impact of social distancing and how this can successfully be implemented in an office setting.

For more information on physical distancing, visit the *CDC*.

Cleaning

Associated with diminished risk of fomite transmission

There is a reason we have all been doing our best to clean door knobs, light switches, bathrooms, kitchens, and even our phones in the midst of the COVID-19 pandemic. Thorough cleaning strategies are a key defense against viral transmission. It is suspected that under certain circumstances, these particles can be transferred to a human through touch, which is why cleaning is one of the leading strategies to mitigate disease spread. That said, much about COVID-19 is still unknown.[17]

A recent study in the New England Journal of Medicine found that the virus can remain viable for up to 72 hours on plastics, 48 hours on stainless steel, 24 hours on cardboard, and 4 hours on copper. What is important to note is that only .1% of the starting virus materials remains alive for these time periods. While it is possible to get infected, it is very unlikely.[18]

A strong evidence base demonstrates the efficacy of consistent and thorough cleaning protocols when it comes to infection prevention. Similar viruses can be inactivated by a range of disinfectants including 70% ethanol, 5% benzalkonium chloride (Lysol), and 10% sodium hypochlorite.[19] Click *here* for guidance from the US Centers for Disease Control and Prevention (CDC) on recommended cleaning practices. What this demonstrates is that regular cleaning of high-touch areas is an effective method of reducing transmission. According to the CDC it is important to prioritize the cleaning of high-touch areas, such as tables, doorknobs, light switches, countertops, handles, desks, phones, keyboards, toilets, faucets, and sinks.[20] While no disinfectants are Green Seal certified, because none are completely harmless, Green Seal does have guidance for how to disinfect safely, which you can click *here* to access.

Cleaning of the surrounding environment has also been shown to influence personal hygiene behaviors. Clean sinks have been shown to also promote proper handwashing technique and increased length of time spent washing hands. Unsurprisingly, when sinks are dirty some choose not to wash their hands.[21]

It will also be vital to provide personal protective equipment, such as gloves and face coverings, for custodial staff, who may be at a higher risk of infection.[22] According to the Occupation Safety and Health Administration and the National Institute for Occupational Safety and Health, personal protective equipment, such as gloves and respirators, should already be provided to building maintenance workers and custodial staff based on their job descriptions and exposure to chemicals.[23] All PPE should also be disposed in a designated receptacle in a secure area, rather than general receptacles within spaces occupied by tenants.

For more information on effective cleaning practices, visit the CDC.

Handwashing Signage

Associated with diminished risk of person-to-person and surface-to-person transmission

According to the CDC, handwashing is the most effective thing one can do to rescue the spread of infectious diseases.[24] While this may seem like a simple task, a vast majority of the populations isn't practicing proper technique.

One study found that hand hygiene, described as handwashing frequency, duration, and hand sanitizer ownership, may reduce respiratory illnesses in shared living settings and mitigate the impact of the influenza A(H1N1) pandemic.[25]

Despite the beneficial impact, a study of handwashing behavior in a college town found that 66.9% of the subjects used soap when washing their hands. Of these, 1.2% did not dry their hands, but left the restrooms with wet hands. About 23% attempted to wash their hands, that is, they wet their hands but did not use soap. A total of 10.3% did not wash their hands at all after using the restroom. The study also found that less than 6% of the sample approached the recommended handwashing duration of 20 seconds.[26]

Luckily, signage can help. To encourage positive change in behavior, handwashing signage has proven effective. The same study as the one referenced above, also analyzed how handwashing signage impacted handwashing practices and found that handwashing signage influenced both handwashing behaviors and the length of washing time. Through observation, the researchers found that signs including messages about correct handwashing or reminders to use soap can increase compliance. Additionally, since more than 1/3 of men "wash" their hands without soap, signage could be especially impactful in men's rooms.[27]

For more information on the importance of handwashing, visit the CDC.

Ventilation

Associated with diminished risk of aerosol transmission

Ventilation is shown to be especially effective when it comes to preventing aerosol transmission. A review of 40 original articles found a conclusive association between ventilation and the spread of infectious disease through the air. Specifically, findings indicate that higher ventilation rates are associated with decreased disease spread. In response to highly contagious conditions like tuberculosis, measles, and SARS, these findings have already been applied within many healthcare spaces. For example, according to ASHRAE isolation rooms, where optimal ventilation rates are required, up to 12 air changes/hour are encouraged to maximize uncontaminated air.[28]

While the spaces where we live, work, study, and play might not require such high ventilation rates, available data does suggest that lower ventilation rates are associated with increased inflammation and respiratory infections. Specifically, a study out of Finland found that ventilation rates of up to 25 l/s per person were associated with reduced prevalence of a host of sick building syndrome symptoms, including communicable respiratory infections.[29] Another study found a dose-response relationship between out-to-indoor air flow rate per person in dorm rooms and the percentage of occupants with at least 6 common cold infections annually. While a mean ventilation rate of 1 L/person was associated with 35% of those who reported having 6 or more common colds, a mean ventilation rate of 5 L/person was associated with just 5% of self-report common colds ≥6 times.[30]

One model looking at how ventilation could prevent aerosol transmission, suggests that for diseases transmitted by droplet nuclei, such as influenza, having good ventilation would be as impactful as vaccinating 50-60% of the population in a poor ventilation scenario. This statistic assumes a 60% vaccine efficacy rate, and cannot be applied universally, but does give a good idea of the potential impact ventilation could have on disease spread, if COVID-19 is in fact being transmitted through the air.[31]

All of that said, when it comes to ventilation, it is important to balance sustainability concerns with those relating to disease spread. Recent studies suggest that natural and hybrid ventilation strategies have demonstrated success when it comes to saving energy while also maintaining an optimal indoor air quality for occupants.[32]

As always, the unique context must be considered, as there are many factors that dictate the most appropriate ventilation mechanics for a specific building, and ventilation alone should not be relied on alone to prevent viral transmission.

For more information on ventilation, visit ASHRAE.

Filtration

Associated with diminished risk of aerosol transmission

While changes to air filtration practices may take additional effort to implement, it is worth mentioning as this approach can help property managers, architects, and engineers plan for the future and prioritize efforts to maximize indoor air quality. Research suggests that filtration of recirculated air may be effective in reducing transmission of airborne infectious diseases. When operating at their full potential high-efficiency particulate air (HEPA) filters can remove 99.97% of particles that are 0·3 microns or larger. These filters remove dust, vapors, bacteria, and fungi, and also effectively capture viral particles spread by droplet nuclei.[33]

Air filtration is one part of a complex air quality system, and before upgrading the capacity of the existing HVAC system must be considered. While some will only be able to handle MERV 13 filters, others might be able to successfully install HEPA filters.

One study uses a hypothetical 500 m2 office with 3 m ceilings and 25 regular occupants to demonstrate the individual likelihood of influenza infection during an 8-hour workday depending on different levels of HVAC filtration. Based on the well-established Wells-Riley model for predicting risk of infectious disease transmission, this study predicts that the risk of infection in an environment using MERV 13 or greater levels of filtration is approximately 31% to 47% lower than in a similar space without any filtration.[34]

According to industry experts on the difference between filtration levels, while MERV 13 filters tend to trap less than 75% of air particles between .03 and 1.0 microns, MERV 16 filters can trap 95% or more.[35]

Filtration is one part of a broader mechanical system, and like ventilation must be considered in the context of the whole building, and should not be relied on alone to prevent viral transmission.

For more information on filtration, visit ASHRAE.

Humidity

Associated with a diminished risk of surface-to-person and aerosol transmission

Environments with low humidity are more supportive of viral viability, meaning that viruses spread faster in less humid conditions. This is because droplets in dry air evaporate quickly, reduce in size and fall to the ground more slowly, travel further, and reach more people and/or surfaces. The means that more humid environments are less hospitable to virus survival and transmission.[36]

The evidence indicates that maintaining indoor humidity between 40% and 60% is associated with a significant reduction in the infectivity of an aerosolized virus.[37]

One prospective study found that an increase in average absolute humidity from 6.33 millibars (mb) in control rooms to 9.89mb in humidified rooms (Relative Humidity ~42–45%) was associated with a significant decrease in influenza A virus presence on objects as well as in air samples.[38] Another study looking into the role of relative humidity in the aerosol transmission of influenza found that at a relative humidity of ≤23% total viruses collected for 60 minutes retained 70.6-77.3% infectivity, but at ≥43% the viruses collected only retained 14.6-22.2%. What this shows is that even keeping the indoor environment at a humidity of between 30-60%, can have a profound impact on aerosol transmission.

While we know that humidity is effective at reducing the length of time virus particles remain viable, there are also serious health concerns that must be considered when increasing humidity within a space. This is especially true for older buildings, which oftentimes weren't built or designed to support higher humidity rates.[39] Humidity should be regulated by property managers and building owners, and we do not recommend personal humidifiers within commercial buildings as that can disrupt overall humidity levels.

For more information on humidity, visit ASHRAE.

Applying Fitwel Strategies

Fitwel is the world's leading certification system committed to building health for all®. Fitwel includes several strategies associated with reduced viral transmission, which you can find listed below. For more details and to download Fitwel Scorecards, visit *Fitwel.org/resources*.

MF: *Multifamily Residential Scorecard* ***WP:*** *Workplace Scorecard* ***RT:*** *Retail Scorecard*

Indoor Air Quality Policy

(MF 6.3, WP 6.3, RT 6.3)

Fitwel's Indoor Air Quality Policy strategy features requirements around ventilation and filtration which can help promote high quality indoor air and support prevention of aerosol transmission.

Indoor Air Quality Testing

(MF 6.4, WP 6.4, RT 6.4)

Fitwel's Indoor Air Quality Testing strategy features requirements around particulate matter levels, encouraging high quality HVAC systems. In addition, testing requires a relative humidity of between 30-60% promoting higher indoor humidity while limiting mold growth.

Integrated Pest Management

(MF 6.8, WP 6.8, RT 6.8)

Fitwel's Integrated Pest Management strategy requires implementation of cleaning protocols, and while not their main mission, a beneficial byproduct of these protocols are enhanced cleaning practices that control surface-to-person viral transmission. In addition, we want to make sure our conversation is not only focused on other viruses, but also to help create more resilient buildings. IPMs are essential in managing vector-borne disease transmission caused by viruses, bacteria, and parasites.

Operable Windows

(MF 7.3)

Fitwel's Operable Windows strategy supports adequate ventilation which can help reduce aerosol transmission of a virus

MF: *Multifamily Residential Scorecard* ***WP:*** *Workplace Scorecard* ***RT:*** *Retail Scorecard*

Regular Cleaning Protocol for Bathrooms

(WP 8.1, RT 8.1)

Fitwel's Regular Cleaning Protocol strategy targeting bathroom cleanliness requires regular cleaning of high-touch surfaces such as counters and bathroom fixtures, including sinks and toilets. The requirements also address restocking needs for soap, toilet paper, and paper towels. Ensuring bathrooms are cleaned regularly and properly stocked can help decrease fomite transmission of a virus.

Regular Cleaning Protocol for Common Areas

(WP 8.4, RT 8.4)

Fitwel's Regular Cleaning Protocol strategy targeting break area cleanliness requires regular cleaning of high-touch surfaces such as counters, tables, sinks, and appliances, including refrigerators, freezers, microwaves, and coffee machines. The requirements also address restocking needs for hand soap, dish soap, and sponges. Ensuring break areas are cleaned regularly and properly stocked can help decrease fomite transmission of a virus.

Educational Hand-Washing Signage

(WP 8.2, RT 8.2)

Fitwel's Educational Hand-Washing Signage strategy requires bathrooms to include permanents hand-washing signage that includes educational language around the health benefits of hand-washing. Signage promoting hand-washing and explaining its unique benefits has been shown to encourage proper hand-washing technique, such as making sure to wash hands for a full 20 seconds. This becomes increasingly important during times of disease spread.

Photo courtesy of Tishman Speyer

Areas for Continued Investigation

This section is aimed at beginning to answer questions we have received from Fitwel users. There are several emerging viral mitigation tactics that are being discussed where we still have more to learn when it comes to potential impact and unintended consequences. We have provided high-level information on several topics below, and will continue to explore as additional research emerges.

Materials

What role could materials play in addressing COVID-19 transmission?

While copper has long been known for its antimicrobial properties, studies exploring the antimicrobial properties of metallic copper surfaces is relatively new, ramping up in 2008 when the Environment Protection Agency (EPA) registered hundreds of copper surfaces as antimicrobial.[40] Several hospital-based studies have demonstrated the ability of copper surfaces to kill bacteria. For example, one 10-week trial at a hospital in Birmingham, United Kingdom found that, compared with control surfaces, median numbers of bacteria found were between 90% and 100% lower on copper-containing surfaces.[41]

When it comes to killing viruses, copper has also been shown as an effective solution. One study comparing the inactivation of Influenza A on copper versus stainless steel surfaces found that copper was much more effective. Specifically, the study found that, "After incubation for 24 h on stainless steel, 500,000 virus particles were still infectious. After incubation for 6 h on copper, only 500 particles were active."[42] In addition, a recent study, found that when it comes to COVID-19, the virus could only remain viable on a copper surface for 4 hours – significantly less than the 72 hours of viability on plastic.[43]

The role materials play in fighting fomite transmission is a promising area, and one that we will continue to follow as additional research emerges in response to COVID-19.

UV Light

What role could UV-Light play in addressing COVID-19 transmission?

Over the past decade capability of UV light have expanded, and new tools have developed that address previous concerns over UV light's carcinogenic and cataractogenic properties. Research has begun to show the efficacy of UV light when it comes to mitigating the spread of airborne aerosolized viruses, as well as cleaning of surfaces. One recent study found that a very low dose of UV light (2 mJ/cm of 222-nm light) successfully inactivated >95% of aerosolized H1N1 influenza viruses. This study suggests that far-UVC light is a promising method for limiting aerosol transmission.[44]

Studies have also begun to show how UV light can safely reduce pathogens on surfaces, with one article find-

ing that low disease of UC-V light (10-300 mWs/Cm^2 at 260nm) effectively inactivated foodborne viruses, including murine norovirus-1 (MNV-1) and hepatitis A virus (HAV).[45] That said, HAV was more resistant to UV-C radiation that MNV-1, indicating that viruses react to UV light differently, and more study on the response of COVID-19 to UV light is needed.

Personal Protective Equipment

What role could Personal Protective Equipment play in addressing COVID-19 transmission?

The use of personal protective equipment (PPE), such as facial coverings and disposable gloves, has become increasingly common, and has been shown to be effective in certain circumstances. For example, according to the World Health Organization, studies suggest that use of medical masks can prevent a virus from spreading from an infected person to someone else via respiratory droplets.[46] Recommendations around wearing face coverings are based on logical conclusions, rather than hard evidence regarding prevention. The evidence confirming that face masks can provide effective protection against respiratory infection within a community context is minimal.[47] That said, health care workers wear face masks as a precaution to avoid infection, thus the guidance from the CDC, and other health organizations globally regarding face coverings is based in sound logic. There is much still unknown about COVID-19, and face coverings are a precautionary measure that may have a positive impact, but more research is needed to confirm.[48]

This resource is designed to contribute to the ever-evolving conversation around how buildings can support the fight against COVID-19. We will continue to review new research as it emerges and incorporate into our work as appropriate. Please reach out to us at covid19@fitwel.org with any specific questions.

**** Disclaimer:**

- Research on COVID-19 is currently in its very initial stages and new evidence is constantly emerging. New evidence will be added as our team analyzes, and will be incorporated into our messaging.
- Because COVID-19 is such a new disease, many of the research articles included below reference the transmission of other viruses.
- We are contributing to this public health discussion, providing ideas and generating conversation, not necessarily providing foolproof solutions.
- We are continuing to collaborate with thought leaders and discovering the best ways to meet this challenge together.
- None of this should be taken as medical advice, and individuals should consult with their doctors if they are experiencing symptoms of COVID-19.

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