COVID-19 Fact Sheet #4
Reducing the Risk in the Workplace
April 12, 2020

The information in this Fact Sheet is built on the information provided in the first three Fact Sheets. To minimize repetition, it is assumed that those were read.

Industrial hygienists and other health and safety professionals consider the "Hierarchy of Controls" when evaluating risk and implementing measures to reduce the risk. Fact Sheets #1 and #2 provided information on the virus: the "Hazard", and the "Risk" associated with it. Fact Sheet #3 jumped ahead a little to "Controlling the Hazard" to talk about respirators and face masks because that had become such a hot topic. But let's back it up now and look at controlling the hazard as we would any other type of safety and health hazard. I think it is helpful to do this within the context of the "Hierarchy of Controls" as an organized way to put together some guidance and response. These are described for the non-healthcare workplace. There are costs, some of them substantial, that are incurred as the result of some of these control activities. While that is acknowledged, balancing the cost/benefit of these items is beyond the scope of my expertise and not addressed in this Fact Sheet.

Hierarchy of Controls

Control	Hazard Reduction
Elimination of the Hazard	Most effective
Substitution with something less hazardous	
Engineering Controls	
Administrative and Work Practice Controls	
Personal Protective Equipment	Least effective

Elimination of the Hazard

How do you Eliminate this Hazard?

The only way to "eliminate" the hazard is to keep the virus out of the facility. This includes:

- Keeping employees who have tested positive and others who share their living space isolated at home until they have met the criteria for returning to work.
- Arrange for employees to work from home when this is possible.
- Encourage employees to remain home at the first sign that they are not feeling well.
- Early detection of those with infection.

Early Detection of those with Infection
It would be awesome if we had testing that could be done at home or in the workplace to rapidly determine, within minutes, whether infection was present. Until that is possible, efforts to identify those with potential infection as they enter the workplace consists of two activities:

- Quick questions or observations to identify those with symptoms: coughing, fatigue, body aches, etc.
- Temperature screening

Temperature screening is conducted to identify someone with a fever, defined as a temperature at 100.4 degrees Fahrenheit or above. Normal body temperature, considered to be 98.6° F (37° C) shows daily variation of 0.9° F (0.5° C). The lowest levels are at about 6 am and highest between 4-6 pm. Facts to consider:

1. Factors that can decrease temperature include:
    a. Constriction of the blood vessels in the skin during the very early phase of fever development. The body is trying, early on, to increase the core temperature. The initial response is to constrict blood vessels in the skin to preserve heat to the core of the body. The skin is cooler – resulting in a false negative reading based on skin temperature. This very early response may be occurring at the time when the person is most likely to shed virus.
    b. The individual has taken medication that reduces the body temperature. Drugs that reduce the body temperature may be taken to minimize body aches or a headache which are early symptoms. Employees should be cautioned that this can lead to false readings.
    c. A reduced ability to develop fever in those who are 65 years or older.
2. Factors that increase body temperature include:
    a. Sitting in a hot car or standing in the sun
    b. Exercise
    c. Hot flashes from eating spicy food, histamine reactions, hormone fluctuations
    d. Pregnancy

The accuracy of the device and the way the device is being used can also alter results.

Temperature screening should also not minimize social distancing and include protection for the individuals who are doing the screening. Finally, a decision should be made, in advance of doing screening, on what the next steps include if someone is identified with a "fever". Are they sent home until they get tested? Are those they share living space with also sent home? When can they come back to work?

Substitution

Substitution of this "Hazard" with something less hazardous is not an option.

Engineering Controls

Engineering controls are those items that reduce the risk and do not depend on human behavior to be effective. The risk of infection with the virus increases with exposure and with the amount and duration of virus exposure. Controls should reduce both the amount of exposure to the virus and the duration of the exposure. Anything that *interrupts the pathway* between the hazard and the employee could be an engineering control. Examples include:

- Plexiglass screens between individuals who cannot maintain six feet of separation
- Tables placed in front of reception areas to create a six foot distance

Engineering controls for "hazardous" substances often includes some type of ventilation element. The ones that work best are those that act at the source, capturing the substance and pulling it away from the worker's breathing zone. This is not an option in this case for a typical office or manufacturing environment. While it might be possible to make adjustments in some environments, e.g. increasing the number of air changes or adapting the ventilation system to 100% outside air and no recirculation, dilution is not the best solution for "pollution". This was illustrated in the CDC publication "Guidelines for Preventing Transmission of *Mycobacterium tuberculosis* in Health-care Facilities" in the Morbidity and Mortality Weekly Report (43 No. RR-13) in 1994:

TABLE 1 Air changes/hour (ACH) and time required for airborne-contaminated removal efficiencies of 99% and 99.9%

ACH	Minutes to remove 99%	Minutes to remove 99.9%
2	138	207
4	69	104
6	46	69
8	35	52
10	28	41
12	23	35
15	18	28
20	14	21
50	6	8

Source: American Conference of Governmental Industrial Hygienists. Industrial Ventilation: A Manual of Recommended Practice. 24th ed. Cincinnati, OH: ACGIH, 2001. Note: Values apply to an empty room with no aerosol-generating source. With a person present and generating an aerosol, this table would not apply. Removal times will be longer in rooms or areas with imperfect mixing or air stagnation.

This Table is not presented as a recommended solution for reducing exposure to an airborne virus. It is included only to illustrate that dilution is not the solution. There are some spaces in manufacturing environments where it may be important to minimize the number of occupants or make adjustments for stagnant air by keeping doors open, adding fans, or running the room air conditioner if pulling air from outside the space. Examples include small quality control laboratories and offices built within the manufacturing space for supervisors, group leaders or maintenance.

Administrative and Work Practice Controls

There are three categories:

- Company Policies
- Employee Behavior
- Environmental Cleaning and Sanitizing

Company Policies

Company Policies can include:

1. Providing factual information to employees regarding the hazard and the controls. This is particularly important when there is so much misinformation that is broadcast on a daily basis.
2. Arrange for social separation:
    a. At work stations
    b. Conduct virtual meetings and training
    c. Juggle times for breaks and lunches
    d. In smoking areas – these may need to be expanded to include more outside space. Separation is critical since face masks will not be worn and smokers (including electronic cigarettes) are at high risk due to smoking's effects on the respiratory and immune systems.
3. Minimize the need for shared tools or office devices including keyboards and phones. For example, if someone covers for reception personnel at break times they should not be sharing foam covered head phones. While the plastic may be sanitized, there is no effective practical method to sanitize the foam.
4. The latest trend in office space is to not assign spaces. This is not a good idea at this time. Minimize the amount of space that each person is using to minimize the need for cleaning and sanitizing.

Employee Work Practices

Things that Employees Can Do:

1. Stay home if ill
2. Maintain social distance
3. Keep hands away from the "T" zone of the face: eyes, nose, mouth
4. Wash hands with soap and water
5. Use hand sanitizer when soap and water is not available
6. Wear a face mask. Face masks should be discarded or taken home and washed in the normal laundry. They should not be reused. Viable virus has been detected at 7 days on the outer layer of a surgical mask when tested under laboratory conditions.

Environmental Cleaning and Disinfecting
We can divide this into two categories: high touch surfaces and "other" surfaces. We can look at two different exposure risk scenarios: routine and after a known infection.

Basic Principles of Cleaning and Disinfecting
These principles apply to cleaning and disinfecting hard, non-porous surfaces.

- Surfaces must be clean before they can be sanitized since a layer of dust or other material decreases the effectiveness of the disinfectant.
- The disinfectant must be effective against an enveloped virus. The disinfectants that have been approved for COVID-19 are listed on EPA's List N Disinfectants for Use Against Sars-CoV-2.
- The disinfectant must adequately cover the surface.
- The disinfectant must be applied in an amount that allows the surface to remain wet for the required "dwell" time. This dwell time should be noted on the label and can also be found on the EPA's List N. The dwell time ranges from 0.25 to 15 minutes.
- Personal protective equipment should be used that protects the worker from exposure to viral particles as well as the disinfectant.

It should be noted that disinfectants are considered "Pesticides" regulated by EPA. They are exempt from the OSHA Hazard Communication requirements for identification of the ingredients. (OSHA requires identification of ingredients when they are present at 1% or more; 0.1% or more for carcinogens.) Pesticide manufacturers must supply health hazard information and comply with the Globally Harmonized System of labeling and Safety Data Sheet completion but they are permitted to claim trade secret protection for the contents of the disinfectant that are not the "active" ingredients. If you look at labels you will see that the disinfectant is typically less than 1% in the product with the remainder listed as "Other". "Other" should not be interpreted as "non-hazardous".

Routine Cleaning and Disinfecting of Frequently Touched Surfaces
Infection control and prevention practices in healthcare focuses on those surfaces that are frequently touched as those of greatest concern for infection transmission. In the non-healthcare workplace, the first step is identification of those frequently touched surfaces. Examples include:

- Door handles and openers
- Vending machines
- Change machines
- Microwave controls and handle
- Refrigerated storage for food brought in
- Breakroom tables and chairs
- Designated smoking area tables and chairs
- Conference room tables and chairs
- Any shared office or cubicle space
- Handrails

- Faucets and soap dispensers (automatic devices eliminate this concern)
- Paper towel dispensers (automatic dispensers eliminate this concern)

> You are wondering about those high speed hot air dryers, right? They are not allowed in healthcare facilities due to concern that the high air flow aerosolizes or makes airborne the microorganisms within reach of the air stream. They can aerosolize bacteria (and presumably viral particles) from clothing and perhaps, the floor. But the alternative that is often used, drying your hands on your clothing, is also not a good alternative. Paper towels should probably be used at least for now.

- Toilets
- Lockers
- Light switches
- Other frequently touched areas as identified at each workstation

Apply wipeable covers, if possible, on frequently touched computer screens, control panels, and keyboards. Many disinfectants will harm screens and should be tested before being widely used on the screens.

The focus on "frequently touched areas" is complicated in workplaces where leather, cloth, or cut resistant gloves are worn consistently as in many manufacturing and construction environments. It is not possible to disinfect every surface. It should be assumed, and stressed in the training, that gloves are probably contaminated and the virus is likely to survive for a day or two. This illustrates the importance of "NEVER TOUCH YOUR FACE WHEN WEARING GLOVES". Hands should be washed after removing gloves. If workers are sanitizing their own work areas they should wear disposable gloves instead of their non-disposable gloves. This prevents the long duration skin exposure to disinfectant that would occur from contaminated gloves. Vinyl is ok for this and saves the nitrile for healthcare workers.

Frequency of Routine Cleaning and Sanitizing of Frequently Touched Surfaces

The routine cleaning and sanitizing should be done during each work shift:

- After work shifts begin and employees have entered the building. This entry into the building is often staggered. It is a judgement call to decide if cleaning and disinfection needs to be done, for example, at 6 AM and again at 8:30 AM or if it can be done once at 8:30 AM.
- After breaks and lunch. These will also be staggered. Cleaning and disinfection are recommended after the majority have taken breaks and lunch.
- At the end of the work shift.

Routine Cleaning and Disinfection of "Other" Surfaces

There was a lot of discussion about the importance of "other" environmental surfaces and the role of those surfaces in infection transmission when there was a concern about TB in the mid-1990s: "Although microorganisms are ordinarily found on walls, floors, and other environmental surfaces, these surfaces are rarely associated with transmission of infections to patients or HCWs [Healthcare workers]." (CDC Guidelines for Preventing Transmission of Tuberculosis in Healthcare Settings 1994.)

The goal is not to sterilize the work environment. It is important to identify the "pathways" for exposure. It is possible for virus to survive on hard surfaces like walls, glass, floors for a week. But those viral particles are not going to fling off the wall and become airborne unless they are disturbed. Spend time sanitizing those areas that may be touched and remember that physical removal of the viral particles can be done with detergent and water. There is a risk of overdoing it with disinfectants. If the disinfectant is strong enough to damage the protein/fat envelope of the virus, it is strong enough to do some harm to eyes, mucus membranes, and skin of those exposed to the disinfectant. Exposure is increased if using a spray or misting device.

Cleaning and Disinfecting After a Known Infection
The following recommendations are provided by CDC:

- Close off the area where the infected employee worked
- Open doors and windows in the area

It seems there is an assumption here that everyone works in an office or defined area and the goal is to increase ventilation to move the viral particles out of the space. It seems to contradict the recommendation to "Close off the area". When the work area is not defined, increasing ventilation may just disperse the viral particles. Consider this recommendation carefully. Do what makes sense.

- Wait 24 hours before cleaning and disinfecting in the affected area, if possible. If 24 hours is not feasible, wait as long as possible.
- Clean and disinfect the surfaces of all common areas used by the employee.

CDC.gov has additional information on disinfection of various surfaces and provides details on how to make up a bleach solution. Since many common disinfectant products are not available, many companies are making their own solutions or purchasing them from vendors. Disinfectant solutions should be concocted only by those who have the expertise to do so safely.

Personal Protective Equipment

This has traditionally been considered the "last resort" for reducing exposure until the bloodborne pathogen programs were put in place. It was then recognized that biological exposures differ from chemical exposures because there are circumstances when engineering controls and work practices are not feasible or do not provide enough protection.

Fact Sheet #3 discusses the difference between respirators as personal protective equipment (PPE) and face masks. The Fact Sheet stresses that respirators protect the wearer, and face masks, whether they are surgical or homemade, are meant to protect others. Since the disposable N95 respirators should be reserved for healthcare and emergency response personnel, it may be necessary for employees to use non-disposable respirators when respiratory protection is required in the workplace. N95 respirators worn in the workplace require compliance with the OSHA Respiratory Protection Standard 29 CFR 1910.134, including the Appendix D which relates to voluntary use of a respirator. Face masks fall outside those requirements.

The CDC recommends wearing face masks in areas where social distancing is difficult to maintain. The masks are worn to prevent the transmission of the virus from individuals who may be infected and shedding the virus before being diagnosed with COVID-19 infection. A plastic face shield can also act as a barrier to droplet exposure. The face mask and the face shield are not designed to provide complete protection from aerosol transmission of the virus.

Disposable gloves should be worn by those who are using cleaning products and those engaged in tasks that present a potential exposure including the handling of waste bags for face masks. Face masks and cloths used for cleaning can go into normal landfill trash. CDC recommends gowns for waste disposal handling. Since gowns can be in short supply and needed for healthcare personnel, look for alternatives that provide an adequate barrier (aprons) and use good work practices to avoid exposure to the contents of waste bags.

Cleaning and Disinfection for Re-entry after Shutdown
CDC states that there is no need for sanitation if a building has been shut down for 7 days or more.

Safety of Building Water Systems during Shutdown
There is a risk of increased growth and spread of *Legionella* and other microorganisms when water is stagnant. During shutdown, have a plan for flushing the water system including eyewash/showers and fire protection systems. Additional details can be found at CDC.gov “Guidance for Building Water Systems”.

In summary, a “Shout Out” to healthcare workers, emergency responders, to those performing essential work and to everyone who is working hard to make the workplace safe for those essential workers. In a perfect world we could make recommendations and decisions based on scientific evidence of what works. We will know more as time goes on but, with so many variables in what is being done in communities and workplace environments, identifying what works best to minimize risk is difficult to determine. Traditional workplace hazards usually have a “source” that can be recognized, pinpointed, and controlled. That is not the case here. The “source” can be someone who is not recognized as presenting a hazard. Some of the activities that are taking place, without any evidence that they work, may be for the purpose of simply making people feel safer. And that’s ok as long as the activity does not provide an exaggerated sense of safety that results in individuals not doing what we know can make a difference: staying home when ill, maintaining social distance, washing hands, keeping hands off the face.

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