

# Guidelines for Frontline Health Care Staff Safety for COVID-19

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## Abstract

This document establishes safety guidelines for physicians, nurses, and allied health care and facility staff who may be exposed to patients infected with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) in a health care facility. SARS-CoV-2 infection is highly contagious and places health care workers at risk for infection resulting in coronavirus disease (COVID-19). Physicians, nurses, and allied health care and facility staff in all frontline environments must be provided and utilize necessary personal protective equipment (PPE). It is important that health care staff adopt a universal set of guidelines in which to conduct themselves in order to minimize infection with the SARS-CoV-2 contagion. The establishment of these guidelines is necessary in this viral pandemic since such directives can create a standard of safety that is universally accepted. These guidelines establish a framework to provide consistency among health care facilities and staff from the time the staff member arrives at the health care facility until they return home. These guidelines provide a practical description of the minimum necessary protection for physicians, nurses, and allied health care and facility staff against SARS-CoV-2 infection.

## Keywords

coronavirus, COVID-19, frontline health care staff, pandemic, personal protective equipment, PPE, respirator mask, safety, SARS-CoV-2

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## Introduction

Physicians, nurses, and allied health care and facility staff are working the front line of the massive wave of patients' sick with coronavirus disease (COVID-19), caused by severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2). The COVID-19 infection is highly contagious and manifested principally as a respiratory tract disease. SARS-CoV-2 has also been reported to significantly involve other organ systems, including gastrointestinal disorders<sup>1</sup> causing nausea, vomiting, and diarrhea with fecal viral shedding<sup>2</sup> and cardiovascular involvement<sup>3</sup> with acute cardiac syndrome, hypokalemia, and cardiac arrhythmia. There is also evidence of neurological manifestations,<sup>4</sup> including stroke and potential neuroinvasive aseptic encephalitis where SARS-CoV-2 has been detected in cerebrospinal fluid.<sup>5</sup>

Transmission of the coronavirus occurs by direct contact with the respiratory droplets and aerosols from an affected person and indirect contact, such as contact with contaminated surfaces or supplies (fomites). The main mode of viral

dissemination is through airborne droplets. As such, to protect frontline staff from becoming infected with COVID-19, it is fundamentally necessary to establish guidelines including use of personal protective equipment (PPE) providing minimum protective measures. As a first step to understanding the status of health care facility preparedness for a viral pandemic scenario, an informal telephone survey interviewing emergency department physicians was conducted from March 30, 2020

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through April 17, 2020. Over 100 health care facilities in both urban and rural areas across the United States were surveyed. Two primary questions were asked which included the availability and quantity of adequate PPE to provide protection against the COVID-19 as well as a written plan of guidelines for protection of physicians, nurses, and allied health care and facility staff during a viral pandemic. None of these facilities had an adequate written plan in use or a consistent approach for health care staff safety regarding COVID-19. Based on the survey findings there are health care facilities across the United States offering no mask, no goggles, no uniforms and only limited PPE of any type leaving physicians, nurses, and allied health care and facility staff to improvise their own protection.

The purpose of this document is to provide guidelines for the minimum necessary protection that physicians, nurses, allied health care and facility staff should be provided with against SARS-CoV-2. infection.

## Guidelines

### *Preshift Clothing*

All staff must arrive from home dressed in clean street clothes that are not expected to be infected. As such, these street clothes should have been recently laundered in hot water (all cycles),<sup>6</sup> with detergent, bleach, and dried in an electric or gas dryer. The SARS-CoV-2, an RNA virion surrounded by a capsid of fat (lipid), should be sensitive to and rendered inactive by this process.

Washing clothing with detergent alone has not been shown to be effective for the complete removal or inactivation of soiled garments with higher concentrations of viral particles.<sup>6</sup> It has been demonstrated that viruses can be transferred from contaminated clothes to uncontaminated clothes.<sup>6</sup> Recommended laundering practice during the COVID-19 pandemic would include the addition of bleach and the use of a dryer.<sup>6</sup> An electric or gas dryer should be operating at the highest heat setting, which typically attains a temperature of 135.2 °F (57 °C) in order to inactivate SARS-CoV-2 which occurs at 132.8 °F (56 °C).<sup>7</sup> The use of dry cleaning for inactivation of viruses is controversial,<sup>8</sup> but when viruses are surrounded by a lipid capsid such as in SARS-CoV-2 they should be chemically inactivated.

### *Personal Hygiene*

In order to reduce or eliminate the COVID-19 virus it is advised that before leaving home or on arriving at the health care facility the staff member should shower from head to toe with soap and warm water. At health care facilities where showering facilities are unavailable and showering occurs at home, staff should proceed directly to their health care facility. Soap is a highly efficient way of inactivating

the virus as its surfactant activity destroys the integrity of the lipid capsid that envelopes the virus particle rendering the virion dysfunctional.<sup>9,10</sup> The virus forms bonds with skin that are easily broken by soap surfactant activity. Water alone is not effective. The water temperature is defined as warm as can be withstood without burning. If the hair on your head is not to be shampooed for personal reasons, the hair must be placed in a clean, fresh covering of plastic or cloth. Head or hair coverings should be disposed of or washed daily. For persons with dry skin, a soap with a moisturizer that rehydrates the skin is advised to avoid xeroderma, this is especially important considering the guidelines contained herein advise multiple showers daily.

After showering from head to toe, either at home before arriving at the health care facility or preferably at the facility, the health care staff will don facility-approved PPE. If personal protective garments are not provided, scrubs and a white coat (or similar covering) is recommended to be provided to the health care staff by the facility and stored at the facility. Since SARS-CoV-2 readily bonds to all exposed skin, long sleeved garments, closed with zipper or button up closures, are recommended for protection.

### *Nonessential Wear*

Remove all jewelry, watches, and other nonessential wear that is not covered by clothing. Watches of all types are discouraged. Cell phones have largely displaced the necessity for watches. Where there is a limited supply of respirators and reprocessed or decontaminated respirator masks are required, the wearing of cosmetic facial makeup should be avoided so as not to soil masks. Soiling of respirator masks will preclude decontamination and reuse.

### *Identification*

Clean identification (ID) badges covered in plastic or lamination coatings with disinfectant wipes or alcohol. Lanyards that support IDs may serve as significant fomites and should be washed daily. Some lanyards made of plastic can be wiped with disinfectant wipes or alcohol. If possible, use clips that can be cleaned and disinfected to attach your ID to your uniform.

### *Hand Washing*

Wash both hands and all fingers with soap and warm water for at least 20 seconds. Since washing time is often underestimated, this duration is the equivalent to the time required to sing the "Happy Birthday" song twice. Wash hands with soap and water or use a concentration of 60% or more alcohol-based hand cleanser frequently and especially before and after each patient contact.<sup>11</sup> In order to avoid skin damage such as chafing, cracking, fissuring and scaling, it is

important to use a moisturizer on the skin frequently following washing with soap and water. If soap with a moisturizer is not available, use a moisturizer after washing. Moisturizing should be done prophylactically since recovery from skin damage can be uncomfortable and prolonged. Although water alone may wash a virus off the skin, it does not adequately compete with the strong interactions between skin and the virus. Alternatively, soap contains lipids, some similar to the lipids in the virus capsid. Soap molecules damage the lipids in the virus and result in dissolution of the lipid coat rendering the virus inactive.

### Cell Phones

Phones and cell phone covers are constantly handled and touched throughout the day and therefore require cleaning. Cell phones and cell phone covers should be cleaned at least once daily advisably after a shift. Manufacturer's instructions advise cleaning phones with disinfectant wipes with gentle wiping motions and avoid introducing any liquid cleaner into charging ports.<sup>12</sup> Guidelines for some cell phone manufacturer's recommend users not use disinfectant wipes.<sup>13</sup> An alternative is to use cleaning wipes that are specifically made for electronic devices. Individually wrapped lens cleaning wipes are commercially available. Additionally, microfiber cloths<sup>13</sup> are also commercially available. Microfiber cloth has the ability to pick-up germs and can be laundered with detergent and warm water. Furthermore, a damp microfiber cloth can remove microorganisms, including viruses and bacteria and is more effective than a cotton cloth.<sup>14</sup> Additionally, a microfiber cloth will not damage your phone the way some disinfectants and sanitizers might.<sup>12,13</sup> A homemade cleaner that is equal parts water and rubbing alcohol can be used to dampen the microfiber cloth, however, be sure it is not excessively wet, when wiping down all surfaces of the phone. This cleaner will serve as an effective disinfectant. Phone covers can be cleaned with similar products. Wash hands when possible before and after using the phone.

### Protective Eye Coverings

Eye coverings such as antifog goggles that fit over spectacles, antifog face shields, or smaller goggles for health care workers without spectacles are recommended to reduce the possibility of infection. Goggles and face shields should be kept clean using the same techniques as described above for cell phones. Protective eyewear is essential to protecting your eyes from SARS-CoV-2 infection though results from studies to date suggest the risk of viral transmission through tears is low.<sup>15</sup> Personal spectacles alone are never acceptable eye protection when isolation from airborne droplets is required such as in this case of SARS-CoV-2. Avoid touching the face with unwashed hands in order to adjust spectacle frames. There are sporadic reports of conjunctivitis in patients

infected with COVID-19<sup>16</sup>; however, this conjunctivitis may be coincidence. In studies of tear samples in patients testing positive for SARS-CoV-2 infection, tear samples tested negative,<sup>17</sup> though a previous study reported positive results, the virus could not be isolated.<sup>18</sup>

There is currently no evidence suggesting increased risk of infection with SARS-CoV-2 through contact lens wearing.<sup>15</sup> Hand washing as described above is suggested when handling contact lenses along with strict adherence to established guidelines for daily cleaning and disinfection. Daily disposable contact lenses should be considered. Contact lens wearers should avoid touching the face with unwashed hands while wearing contact lenses. Contact lens wearing is discouraged in the presence of cold or flu-like signs or symptoms. The above practices should be considered since the eyes represent 2 of the 5 avenues of entrance into the respiratory tract: two eyes, two nostrils and the mouth. All these avenues should be covered and protected in the presence of patients positive for COVID-19.

### Protection of the Nose and Mouth

N95 masks or similar certified masks (KN95) are recommended to be worn in encounters or possible encounters with patients that are COVID-19 positive whether or not patients have signs or symptoms of infection. Though not identical, to the N95 mask, according to the Centers for Disease Control and Prevention (CDC), the KN95 mask is equivalent and can be expected to function very similarly to the N95 mask.<sup>19,20</sup> When a mask is donned, it should be worn and not removed or touched for the entire duration of the medical shift. For those occasions where the mask must be removed during the medical shift, while not advised, proper protocol for removal must be followed.<sup>21</sup> During mask removal, the integrity of the mask must be maintained. Placing the mask on top of the head or pulling it down to the anterior neck or chest or placing it in a pocket or on a counter top is not recommended as contamination is more likely to occur and even the integrity of the mask is more likely to be compromised. When redonning the mask attention to attaining an adequate seal without leak between the mask and the facial skin must occur.

The 95 refers to the capability of the mask to filter 95% airborne particles  $\geq 0.3 \mu\text{m}$  in diameter. The N99 mask filters out 99% of the particles  $\geq 0.3 \mu\text{m}$ . The spherical shaped SARS-CoV-2 measures  $0.125 \mu\text{m}$  in diameter as determined by electron microscopy. Dehydration occurring with sample preparation for electron microscopy further diminishes the size of these microorganisms. Though there is this size discrepancy, the mask is still effective against COVID-19.<sup>22</sup> Incidentally, staff wearing disposable bouffant hair coverings should be aware that the particle size of the SARS-CoV-2 can penetrate the covering material. The N95 masks filter particles, they do not have resistance to solids, for example, fecal matter and liquids, for example, body oils. If

the mask comes into contact with solids, body fluids, or oils it must be discarded,<sup>23</sup> since body fluids and oils may reduce the efficiency of masks.

Before wearing the N95 respirator mask, the user should complete a “fit test”<sup>24</sup> to determine or assure the best respirator model size. The Occupational Safety and Health Agency (OSHA) requires fit testing for all employees required to wear face masks. Masks do expire since the mask components, the strap and nose foam, can degrade over time. Degradation of components can affect the quality of the fit and seal of the mask on the facial skin.

The disposable N95 mask cannot be effectively cleaned or disinfected. With deformation, masks may not fit properly and may not properly protect the user. Cleaning and disinfection changes the consistency of the filtration fabric of the mask so that it will not filter the smaller particles.<sup>25</sup> Disinfecting the mask cannot be performed with a microwave or clothes dryer with or without enclosing it in a plastic bag. The plastic bag can melt or even ignite. Although not recommended in the absence of a N95 mask, if a cloth face dressing is used as a mask<sup>26</sup> the dressing should be machine washed and dried in an electric or gas dryer<sup>27,28</sup> daily. In order to avoid coworkers transferring SARS-CoV-2 or other microorganisms, masks should never be shared.

To ensure that N95 particulate filter respirators provide the intended level of protection, every wearer should receive training. A fit test evaluates the seal between the respirator and the facial skin.<sup>24</sup> The fit test requires 15 to 20 minutes to complete and is performed at least annually. After passing a fit test with a respirator, use of the same make, model, style, and size respirator is required on the job. If the same make, model, style, and size respirator is unavailable and another respirator is provided, the fit test should be repeated. A user seal-check that the mask fits firmly against the skin of the face should be done every time the respirator is worn to ensure achievement of an adequate seal.<sup>29-31</sup>

Where new respirator availability is limited, reprocessed respirators have been recommended by the CDC as a contingency crisis strategy to conserve available respirator supplies. Protocols for reprocessing respirator masks are being developed. Reprocessing must be performed according to a Food and Drug Administration (FDA)-approved (under Emergency Use Authorization) method. For example using vaporous hydrogen peroxide decontamination results in minimal effect to the masks’ filtration function or to fit.<sup>32</sup> Reuse of respirator masks may be accomplished according to the Bettelle System,<sup>32</sup> which is FDA-approved under Emergency Use Authorization or guidance established by the CDC. No reprocessing should be performed on visibly soiled (including those respirators with visible makeup), damaged, or wet respirators. Respirators so damaged must be discarded. Each time a reprocessed or new respirator is used, a user seal-check test must be performed.

## Face Mask Removal

Although no personal protection equipment should be removed for the entirety of a shift, certain precautions should be taken regarding the face mask. N95 respirators ideally should be worn for a maximum of 8 hours and then be replaced.<sup>32</sup> While using the face mask it is best to limit the frequency of using the hands to adjust the mask in order to avoid touching the facial skin with or without gloves. Touching of the mask with the hands or fingers can result in contamination of the facial skin and mask dysfunction. However, OSHA has issued a directive which indicates that a respirator can be reused as long as it maintains its structural and functional integrity and the filter material is not physically damaged or soiled.<sup>33,34</sup> For proper removal of the respiratory mask, first tilt the head forward and using both hands to grab the bottom strap and pull the strap to the side, then over the head. Second, use both hands to grab the upper strap, pull the strap to the side then over the head. Keep tension on the upper strap as you remove it, which will let the mask fall forward.<sup>23</sup>

Respirators can be used for repeated close contact encounters with several patients, without removing the respirator between patient encounters. This extended use of respirators may be implemented when multiple patients are infected with the same respiratory pathogen and patients are placed together in a dedicated waiting room or hospital ward.<sup>23,35</sup> Extended use has been recommended as an option for conserving respirators during previous respiratory pathogen outbreaks and pandemics.

Where a respirator is used for multiple encounters with patients, after each encounter, the respirator is stored safely to be donned prior to the next patient encounter. For pathogens in which contact transmission is not a concern and in a nonemergency situation such reuse has been practiced for decades. Even when N95 respirator reuse is practiced or recommended, restrictions should be in place which limit the number of times the same PPE is reused. N95 respirator reuse is often referred to as limited reuse. Limited reuse has been recommended and used as an option for conserving respirators when in limited supply. Extended use during a work shift is preferable to multiple shift reuse because of the risk of virus transmission with donning/doffing respirators. Employers must provide proper storage of respirators if workers are reusing them over multiple shifts.<sup>23,36</sup>

Hang used respirators in a designated storage area or keep them in a clean, breathable container such as a paper bag. Between uses and to minimize potential cross contamination, store respirators so they do not touch each other and the person using the respirator is clearly identified. Storage in zip-locked or closed plastic bags may promote bacterial overgrowth<sup>36</sup> on both sides of the mask.

Physicians, nurses, and health care and facility staff must train as to how to don and doff the face mask respirator.

This training includes performing seal checks each time they don a respirator and should not use that particular respirator if a seal check<sup>32,37,38</sup> cannot be performed successfully. Health care workers require training on when to discard a respirator due to the structural or functional integrity becoming compromised.

Expired N95 should only be used if no new ones are available. Health care workers should only use NIOSH-Certified Expired N95's and must be informed they are using expired respirators. Health care staff should not mix expired and nonexpired respirators and should visually inspect respirators during each use to ensure integrity. This is because expired respirators are more susceptible to functional failure and require closer inspection. Respirator inspections should be made in order to visually examine the integrity of the filter material, elastic straps, nasal bridge and any generalized or obvious deformity such as along the edges. Edge deformities may not allow the mask to seal properly on the facial skin and may adversely affect the seal-test.

### *Face Mask Cutaneous Irritation*

Cutaneous irritation can result from both the internal atmospheric environment of the mask and irritation from the mask edges creating direct pressure on the skin. This irritation becomes important since it is suggested masks be worn during an entire shift. The internal environment becomes polluted and can consequently manifest as perioral dermatitis. These pollutants can be composed of moisture, vaporous materials, and oral and nasal secretions. Such pollutants may contribute to the development of skin rashes, irritation, and scaling. These factors should be considered when donning a face mask and precautions should include maintenance of skin hydration by using moisturizers.

### *Face Mask–Associated Symptoms*

Wearing N95 mask may have adverse physical effects on staff, including silent hypoxia and hypercapnia,<sup>39</sup> which may reduce work efficiency and the ability to make decisions. Additional symptoms can include dizziness, drowsiness, flushing of skin, shortness of breath, change in mental status, elevated respiratory rate, twitching peripheral muscles, and seizures. Prolonged use of N95 face mask can cause health problems by the repeated recycling of exhaled air causing high concentrations of carbon dioxide to be trapped behind the mask. Severity of symptoms may depend on the wearers underlying health status. Additional factors include the type of mask worn and the number of times the mask has been reused. Driving while wearing the N95 mask is not recommended since the above conditions can impair driving ability with the potential of motor vehicle accidents.

### *Facial Hair*

To ensure best fit of respirator masks, keep beards and facial hair cut short and tightly controlled. The CDC, although advising the wearing of respirator masks to reduce spread of COVID-19, is not calling for the general public to shave their beards. There is no evidence that wearing a beard in and of itself promotes the spread of COVID-19; however, first responders, doctors, and other medical professionals on the front line need to make sure their respiratory mask fits securely and tightly against the face and that a beard or facial hair does not impede fit or loosen face masks. Accordingly, it is suggested that frontline health care providers remove beards and facial hair. An alternative for men with beards and facial hair would be to trim their facial hair in such a way as to allow a tight seal for a respiratory mask, which can only be assured by performing the “seal” test.<sup>23,40</sup> Another alternative to N95 masks for men with beards is the use of a powered air purifying respirator (PAPRI). Until more is known, health care staff maintaining facial hair should commit to shampooing it with soap or detergent daily. Currently, there is no reported evidence that facial hair entraps the COVID-19 and funnels the virus to the face.

### *Disposable Gloves*

Gloves are utilized as needed on an individual patient basis. Nonsterile disposable examination gloves used routinely in all patient health care settings are the type of gloves recommended to care for suspected or confirmed COVID-19 patients. Disposable gloves made for medical purposes are usually made from polymers such as latex and nitrile both protective against viruses. Gloves must be used when in contact with the patients' blood, stool, or other body fluids such as saliva, sputum, nasal discharge, conjunctival discharge or tears, vomit, or urine. Wear disposable gloves while handling soiled items and keep soiled items away from the body. Clean hands with soap and water or an alcohol-based hand sanitizer immediately before and after doffing gloves.<sup>41</sup>

This precludes hand contamination from potential punctures or tears present in the glove material. On glove removal, place all used gloves in a designated receptacle as sporadic viral particles have been detected on gloves.<sup>42</sup> The CDC guidance does not recommend wearing double gloves when providing care to suspected or confirmed COVID-19 patients.<sup>43</sup> Also, according to CDC guidance extended length gloves are not necessary when providing care to suspected or confirmed COVID-19 patients.<sup>43,44</sup>

### *Contact With Blood, Stool, or Other Body Fluids*

It is advised that if any PPE, protective clothing or exposed skin are soiled with blood, stool, or other body fluids,

replace the PPE or protective clothing and clean the area(s) of exposed skin with soap and warm water for 20 seconds. After replacing clothing and PPE items or washing the exposed soiled skin and before returning to work, wash hands with soap and warm water or an alcohol-based hand sanitizer. Feces contaminated with SARS-CoV-2 has been found to be viable in formed stool samples for up to 2 days as well as in diarrhea stools where it was viable for up to 4 days.<sup>45</sup> Fecal transmission has been reported.<sup>46-48</sup> When toileting, use extra precautions to clean toilet and restroom fixtures, including doorknobs after each use. Wash hands with soap and warm water as instructed above.

### Coveralls

No clinical studies have compared white coats, gowns, and coveralls; however, all are being used by health care workers in clinical settings during patient care. Sporadic positive SARS-CoV-2 results were obtained from sleeve cuffs.<sup>42</sup> It is acceptable for physicians, nurses, and allied health care and facility staff to wear coveralls as an alternative to white coats or surgical gowns in the care, treatment, and transport of patients with COVID-19. The CDC has released considerations for selecting protective clothing used in health care for protection against microorganisms in blood and body fluids.<sup>49</sup> The CDC provides guidance in its comparison between gowns and coveralls, including test methods and performance requirements.<sup>50</sup> Coveralls typically provide 360-degree protection because they can be designed to cover the entire body, including the back and lower legs and sometimes the head and feet as well. This added coverage may be necessary for some work tasks; however, coveralls may lead to increased heat stress compared with gowns due to the total area of the body being covered by the fabric. Additionally, training on how to properly remove a coverall is important to prevent self-contamination of fabric coming into contact with the face.<sup>51</sup> Comparatively, gowns are easier to don and doff.

### Footwear

Bring a clean pair of shoes, boots, or other suitable footwear to use exclusively while at the health care facility. After each shift, clean all surfaces of the footwear (including soles and heels) with disinfectant spray or wipes. Plan to leave this footwear at the facility or place them in a closed plastic or paper bag after cleaning them. Properly bagged footwear can be stowed at the health care facility or carried home. It is recommended that the best choice of shoes are those not requiring laces, which facilitates cleaning with spraying or wiping with disinfectant. Shoestrings or boot laces, including aglets are composed of synthetic fibers, such as nylon, textured polyester, spun polyester, and polypropylene as well as traditional natural materials are porous and are prone to harbor viral particles.

Shoes used to travel to the health care facility should be bagged in plastic or paper on arrival at the facility and should become the shoes that you use for travel from the facility to home and around the community. Travel footwear should be cleaned daily because virus particles can become attached and travel with the shoes. SARS-CoV-2 positive tests have been reported on soles.<sup>42</sup> On arrival at home doff shoes and leave them in the garage, mud room, or another appropriate safe place. It is likely that shoes will become contaminated with coronavirus particles at some point either leaving the health care facility or in the community.

### Postshift Hygiene

At the end of each shift, health care workers will retire directly to the facility shower room when available. Health care facilities having a “shower room” available can accommodate an entire department by staggering “end of shift” scheduling. This would allow and accommodate a department at shift change by providing a staggered ending time for each shift, for example, providing 10-15 minutes of time for each worker to shower and leave the facility. Alternatively, if the health care facility does not have a “shower room” area for staff, then health care provider can go directly to the area assigned for removal of PPE. Use approved protocols for doffing PPE.<sup>52</sup> Following the doffing procedure will minimize the risk for disease transmission. It is advisable to have a trained observer help with the process. After the doffing procedure, wash hands with soap and warm water along with any exposed areas of the body. Don clean clothes from home and return to home. Once arriving at home, doff the clothes in the garage, mud room, or other appropriate room. Place clothes in a plastic bag and empty the bag into a washing machine and launder them as reviewed above under the section “Preshift Clothing.” After doffing and properly stowing travel clothes, go directly to a shower washing from head to toe with soap and warm water. All towels used after showering should be laundered.

### Doffing PPE

The entire PPE uniform should be placed in appropriate receptacles prior to leaving the health care facility.<sup>51,52</sup> Separate receptacles shall be provided for disposable respirator masks, shoe coverings, gloves, and disposable hair coverings. Reusable goggles to be cleaned and any personal clothing, including cloth hair coverings, should be carefully placed in appropriate receptacles. Goggles and clothing should be cleaned and provided on the next day for the health care facility staff. Nondisposable cloth hair coverings should be labeled with the staffer’s name in permanent black marker. After doffing PPE and clothing, the health

care worker will complete a head to toe soap and warm water shower. During this shower, all hair, including facial hair should be washed with soap and warm water. With a preshift shower and a postshift shower daily, caution should be exercised with staff members having dry skin to prevent skin damage by using a body lotion of the staff member's choice containing both hydrating and lubricating elements.

### **Postshift Clothing**

After completing a shift, clean clothes from home will be donned. These may be the same clothes worn from home to the health care facility, or a new second set of clothes brought from home before the work shift. The health care worker will retire to home clean. As an additional precaution, health care staff members on arriving home may also remove these clothes, launder them and again shower.

### **Privately Owned Vehicular Transportation**

Clean motor vehicles daily. Testing of motor vehicle upholstery has found COVID-19 particles on interior seats.<sup>53</sup> Cleaning vehicle upholstery, floors, steering wheel, switches and knobs, plastic and other surfaces, interior handles, gear shift/clutch, internal and external door handles, with appropriate cleaners and disinfectants is suggested. This cleaning is of particular importance in the case of transporting newborn infants, geriatric patients, immune-compromised patients, or others with significant underlying medical conditions. This extra step of precaution provides another opportunity to remove SARS-CoV-2 being carried by the health care staff member. If possible, park vehicle in sunlight while working. Sunlight has long been recognized as a disinfectant and may assist in deactivating viral particles.

### **SARS-CoV-2 Testing**

Frontline physicians, nurses, and allied health care and facility staff (eg, maintenance, housekeeping) should be tested initially for the antigen of SARS-CoV-2 and subsequently every 3 days throughout the pandemic. Despite precautions staff members can become infected at the health care facility, home and/or in the community such as when picking up groceries or other items while returning home.

## **Discussion**

If these guidelines are followed daily, the chances of infection with SARS-CoV-2 are likely to be reduced. It is strongly encouraged that all health care facilities adopt the above guidelines to attain a more optimal level of staff safety. In addition to the above guidelines since the SARS-CoV-2 is highly contagious, dedicated scheduled cleaning of the

environments in the health care facilities is required.<sup>53</sup> Such environmental cleaning by trained staff members can better control COVID-19 and reduce the viral load. SARS-CoV-2 has been reported to be widely distributed on floors, computer mice, trash cans, and sickbed handrails.<sup>42</sup> Environmental cleaning should not only include furnishings, ceilings, walls, and floors but particular attention should be directed toward cleaning of airducts and air filters. Viral particles have been reported in air filtration systems and air conditioning ducts.<sup>54</sup> COVID-19 positive aerosol sample sites have been reported in hospital room air outlets.<sup>42</sup> Minimizing the risk of spreading airborne particles in the facility is essential to staff safety. Increases in the amount of viral particles is an important part of staff safety.

It is important not only to consider cleaning and disinfecting personal clothing and skin but also to consider decontamination of the home<sup>55</sup> for the safety of other household inhabitants. It is also important to be aware of the safety precautions regarding the materials we use to accomplish cleaning and disinfecting. Consideration should be given that the number of calls to poison centers increased in early March 2020 for exposures to both cleaners and disinfectants.<sup>56</sup>

These guidelines should be considered the minimal necessary measures to protect health care staff and if followed, should increase health care staff safety and reduce SARS-CoV-2 infection rates. The procedures herein described should be repeated every shift for the duration of the pandemic. Although these guidelines provide an ideal scenario for staff safety, it is also recognized that many communities and countries do not have the resources to implement them, in their entirety. As such, in these situations implementation of these guidelines are decisions that would have to be made recognizing the best allocation of resources. Although the guidelines contained herein are meant to apply to the majority of the health care staff, there are instances where these guidelines do not apply to the entire staff. However, our recommendations are meant to apply to all health care workers on the frontline. Only by protecting front line health care workers with a comprehensive uniform approach can a significant reduction in the morbidity and mortality of these health care facility workers and their families be accomplished. This is important in order to ensure maintaining adequate numbers of uninfected well-trained health care facility physicians, nurses, and allied health care and facility staff.

### **Authors' Note**

This protocol of guidelines was presented on April 13, 2020 in part to the American Association of Physician Specialists.

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## Declaration of Conflicting Interests

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