



Minimum Recommended Guidance on Protection and Decontamination for First Responders Involved in COVID-19 Cases – Detailed Reaction Guide

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Responders can be exposed to the SARS-CoV-2 virus responsible for COVID-19 by inhaling aerosolized droplets from an infected individualized persons' coughs and sneezes as well as contact with contaminated surfaces with subsequent hand transfer to the mouth, nose, or eyes. First responders may be at increased risk for exposure with potentially sick patients from increased aerosol and fluid volumes and close proximity. For this reason, extra caution in the selection, handling, and cleaning of PPE used by first responders must be exercised. Specific considerations must be given to respiratory, ocular, and skin protection for lessening exposure.

MINIMUM GUIDANCE ON PPE

PPE Considerations for Protecting Against Inhalation

To reduce the risk from inhalation exposure, responders should conduct initial patient assessment from 6 feet away, or the doorway if possible. If an infectious disease is suspected, donning a respirator effective against COVID-19 is paramount.

- Surgical or procedure masks, medical face masks, and many dust masks are not respirators and should not be relied on for protection from inhalation of contaminated aerosols.
 - If these types of products are the only type of face covering available, then they should at least meet the requirements of ASTM F2100 [1] Level 2 or Level 3.
 - They can also be used as a cover over certain types of respirators to extend their service time, but this practice comes at the expense of increased breathing resistance [2].
- Instead, the minimum level of respiratory protection is an N95 filtering facepiece respirator that is certified and approved by the National Institute for Occupational Safety and Health (NIOSH) per specific filtration efficiency and other requirements.
 - These respirators offer a better faceseal through the use of two straps and are rated to block 95% of the particulates that have an average size of 0.3 microns. In comparison, cough aerosols can have a diameter of 0.35 to 10 microns in size [3]. Measured average droplet sizes for sneezes are generally larger but can involve larger volumes of expelled aerosol [4].
 - N95 respirators are designed for one-time use followed by disposal. During a pandemic, this may not be possible due to limited supply chain options. The CDC provides guidance for extended use and limited reuse of N95 respirators at: <https://www.cdc.gov/niosh/topics/hcwcontrols/recommendedguidanceextuse.html>. The ability to reuse or extend the life of these respirators must be balanced carefully with the risks. Therefore, a written plan should be utilized to ensure compliance.
- Improved respiratory protection is offered by wearing NIOSH-approved P100 filtering facepiece respirators, which offer a better faceseal on the wearer's face compared to N95 respirators by incorporating adjustable straps and are rated to provide a filtration efficiency of 99.97% against sodium chloride particulates with an average size of 0.3 microns. Tests of these respirators against viral surrogates (of much smaller size) have shown this same level of effectiveness or better [5].



- Disposable respirators with European classifications are also available, namely those designated FFP2 (equivalent to N95) and FFP3 (roughly equivalent to P100).
 - NIOSH evaluations for representative models of these different facepieces using much smaller aerosol particles in the range of 30 to 60 nanometers (1/10 the size used in normal testing) showed percentages of penetrating particles as <4.28%, for N95, <2.22% for FFP2, <0.009% for P100, and <0.164% for FFP3 respirator models [6].
- P100 level protection can also be provided by reusable elastomeric facepieces (air-purifying respirators or APRs) that use P100 filters, cartridges, or canisters. These types of respirators provide a higher protection factor because they allow better sealing of the respirators to the individual wearer's face. The P100 filters or cartridges also provide the same level of filtration performance described above for P100 filtering facepiece respirators but allow for replacement of the filters and cartridges as needed.
 - At this time, there is no defined service life for P100 filters or cartridges. The length of time these filters or cartridges can remain effective is dependent on the level of exposure, levels of other ambient particles that may be present, and their design (open versus housed filters). Typically, particulate filtering media is changed when increased breathing resistance is experienced.
 - The filters or cartridges should be stored according to manufacturers' directions when not in use.
- Other types of cartridges that incorporate P100 filtering capabilities but are combined with chemical adsorption capabilities.
 - A common form of this type is a combined organic vapor/acid gas cartridge that is coupled or integrated with a P100 pre-filter. Similarly, a Cap-1 canister used for CBRN respirators provides P100 capabilities. However, both types of products are relatively expensive, much heavier than P100 filters alone, and can adsorb humidity or environmental non-hazardous contaminants leading to short service life.
 - The filters or cartridges should be stored according to manufacturers' directions and in a humidity-free container when not in use.
- Powered air-purifying respirators (PAPRs) are another option that use the same types of canisters and cartridges and may either be connected to a reusable elastomeric facepiece or combined with a hood. In either case, a blower pulls air through the cartridges or canister to provide filtered air. Hoods used with PAPRs are generally constructed of disposable materials that need to be replaced.
- Reusable respirators require specific cleaning and sanitization when reused or shared among different first responders.

PPE Considerations for Ocular Protection

Though it is considered a much less likely route of entry, contact of the individual's eyes with aerosol or by touch contaminated by COVID-19 is a possible form for transmitting infection [7]. Normally, covering the eyes and face is a useful precaution to limit any actual touching or contact with the eyes. Yet, first responders should understand limitations of any eyewear used and consider specific approaches to limit any ocular exposure.

- A NIOSH study has shown faceshields that provide physical protection to the face from direct contact have limited effectiveness in protecting the wearer's eyes [8]. Safety glasses have not



specifically been evaluated for their aerosol protective performance; however, they are similar to faceshields in not fully protecting the eyes from exposure to contaminated aerosols [9].

- If faceshields or safety glasses are used in the absence of alternative eye/protection, these items should meet requirements in ANSI Z87.1 [10].
- Goggles that are marked to either the “D3” or “D5” requirements of ANSI Z87.1 offer primary eye protection and are recommended for ocular protection and liquid splashes and bioaerosols.
- Respirators that include full facepieces also offer primary ocular protection.
 - This form of face protection is considered superior because a relatively good face seal is achieved between the facepiece and the user’s face.
- Surgical or procedure masks that incorporate thin plastic shields offer little protection to the eyes by themselves.
 - These types of integrated mask and shield are best used in conjunction with safety glasses.

PPE Considerations for Dermal Protection

COVID-19 is not transmissible through the skin. Nevertheless, protective clothing is valuable for limiting potentially infectious aerosols and liquids from contaminating the skin and regular or uniform clothing, which through later hand to nose, mouth, and eye contact can cause transmission and infection. Responders can reduce exposures hazards from contact and self-inoculation exposures by avoiding touching possibly contaminated surfaces, using topical skin barrier products, avoiding touching their face, instituting proper hygiene practices, and utilizing personal protective equipment (PPE). Ideally, protective clothing should have barrier properties that limit penetration of any contaminated liquid and resist absorption of liquids to limit outer clothing as a continuing source of contamination. Specific recommendations for protective clothing include the following:

- The minimum dermal protection is for use of gloves. Examination gloves that meet ASTM D3578 (latex rubber) [11], ASTM F6319 (nitrile) [12], ASTM D6977 (chloroprene) [13], EN 455 (examination gloves) [14], or NFPA 1999 [15] standards must be worn primarily to minimize contamination of the hands.
- Double gloving is recommended in those cases where extensive liquid contact is expected, perforations of gloves due to physical activity may occur, and as an aid to the removal of outer clothing where additional inner gloves can be in place to aid overall doffing and maintain protection if subsequent contact is anticipated [16].
- Protective garments are recommended as a form of contamination control. Wearing of protective garments prevents the contamination of work uniforms or other clothing that can subsequently result in hand to nose, mouth, and eye contact (auto-inoculation).
- It is preferred that protective gowns and garments offer some form of barrier resistance to resist penetration of liquids through the clothing material.
 - Materials and seams used in the construction of garments should provide passing results when evaluated to ASTM F1671 [17] or meet the Class 5 requirements established in EN 14126 [18] when tested according to ISO 16604 [19].
 - Viral penetration resistance testing established in both ASTM F1671 and ISO 16604 is considered suitable since the microorganism used as a surrogate virus in the test has a diameter of 27 nanometers as compared to the reported diameter 60 to 140 nanometers for the SARS-CoV-2 virus that is responsible for COVID-19 [20].



- Surgical or isolation gowns meeting the Level 4 criteria in AAMI PB70 [21] demonstrate the above performance.
 - Isolation gowns are preferred over surgical gowns because many surgical gowns only have portions of the garment with the requisite barrier performance whereas isolation gowns provide uniform barrier performance over the entire product.
 - Where specified, isolation gowns should also meet ASTM F3352 [22].
 - Gowns also lack seams in the front torso area with back openings that require special doffing procedures.
- Single or multiple use garments such as coveralls or coat/pants meeting the respective NFPA 1999 criteria also demonstrate viral penetration resistance performance.
 - These garments are evaluated for liquid integrity as part of their overall design to show that liquids will not easily penetrate closure areas such as front zippers.
 - Multiple use garments possess higher levels of durability and are intended to be cleaned and reused if properly sanitized.
- Certain other types of certified garments available to first responders that also provide viral penetration resistance of materials and seams including:
 - Technical rescue gear that meets NFPA 1951 [23] for rescue & recovery.
 - Turnout gear that meets NFPA 1971 [24] for structural firefighting.
 - Class 2, 3, and 4 hazardous materials and CBRN ensembles that meet NFPA 1994 [25] for chemical and biological hazards.
 - Like reusable garments, the repeated use of these garments following potential contamination requires special cleaning and sanitization.
- Integrated protective ensembles of clothing and equipment that are evaluated as a system for performance for both barrier and integrity provides the most optimal protection.
 - The wearing of a single-use or multiple-use emergency medical protective ensemble certified to NFPA 1999 defines suitable complete protection.
- In the absence of protective clothing meeting the above standards, the recommended minimum criteria in addition to the barrier requirements above are garments with appropriate levels of physical strength that include:
 - Grab tensile strength greater than 50 Newtons (11.2 lbs force) per ASTM D5034 [26].
 - Puncture propagation tear resistance greater than 12 Newtons (2.7 lbs force) per ASTM D2582 [27].
 - Seam strength greater than 50 Newtons (11.2 lbs force) per ASTM D1683 [28].
 - Clothing manufactured to previously identified ASTM or NFPA standards includes criteria that exceed these requirements.
 - Clothing specified in accordance with European Standard EN 14126 should have Type 3-B performance or higher.
- Performance specific to biological aerosols can also be demonstrated by protective clothing materials that meet the Class 3 requirements of EN 14126 when tested according to ISO 22611 [29]; however, it is unknown how this performance specifically relates to passage of aerosols containing SARS-CoV-2 through clothing materials.
- Since it is anticipated that the availability of liquid barrier clothing will diminish significantly with a pandemic, it is recommended that disposable clothing can be used for operations involving minimal exposures such as handling or supervising of population testing in drive-through test centers.



PPE Donning, Use, and Doffing Considerations

- Prior to donning PPE, consider applying a topical skin barrier product to hands and/or face, if available.
- Put on PPE items in accordance with manufacturer's instructions and as trained by issuing organization.
- Wear correctly sized PPE, including respirators, eye/face protection, gloves, and garments.
- Wear the same model and size of respirator after the quality of the faceseal has been checked by qualitative or quantitative fit testing.
- Conduct a seal test when wearing a respirator.
 - Perform a positive pressure seal check of the respirator by deeply inhaling to observe if the respirator pressurizes by exhaling gently while blocking the paths for air to exit the facepiece (a successful check is when the face piece is slightly pressurized before increased pressure causes outward leakage); or
 - Perform a negative pressure seal check by sharply inhaling while blocking the paths for air to enter the face piece (a successful check is when the face piece collapses slightly under the negative pressure that is created with this procedure).
- When donning and doffing PPE, avoid the use of ChemTape (or any other tape) on interfaces that might need to be removed – **DO NOT TAPE RESPIRATORS TO GARMENTS.**
 - Many of the minimum recommended materials used in the construction of these types of garments can rip/tear when the tape is removed thereby causing a potential point for cross-contamination.
 - If creating an interface between the gown or garment sleeves to the gloves using tape, it is recommended that a solid surface (like a piece of PVC pipe or a glove insert cone) be used to tape the outer gloves to the sleeve. This creates a quasi-interface that allows for the outer gloves to be removed with the garment while maintaining the integrity of the inner gloves which can then be used to assist with contaminated doffing of the gear.
- While operating in a potentially contaminated area, avoid touching or making any adjustments to your respirator or eye protection.
- If any PPE is compromised or damaged during use, exit the area, appropriately doff contaminated items (see below) and replace affected PPE before re-entering contaminated area.
- If PPE is obviously or grossly contaminated, consider decon/disinfecting prior to doffing to reduce the hazards from cross-contamination during the doffing process.
- Establish a sequence for removing contaminated PPE based on the PPE items being worn and practice those doffing procedures to become familiar with correct doffing to minimize potential for cross contamination.
 - Adapt generalized doffing procedures from the Center for Disease Control (CDC), World Health Organization (WHO), or other recognized organizations based on the specific PPE that is available.
 - CDC: <https://www.cdc.gov/hai/pdfs/ppe/ppe-sequence.pdf>
 - WHO: <https://www.who.int/csr/resources/publications/putontakeoffPPE/en/>
 - Use human factors evaluations of PPE donning, use, and doffing to identify areas or risk [30].
- Never remove respirators while still operating in a contaminated area. Remove respirator last as part of doffing process.



- Thoroughly wash hands or use hand sanitizer following the use of any PPE in a contaminated area.
- Carefully dispose of used, single-use PPE.
 - If contaminated with blood or other potentially infectious materials, dispose as biohazardous waste.

PPE Cleaning, Sanitization, and Disinfection of Considerations

Very preliminary information is emerging that indicates the viability of SARS-CoV-2 on various types of surfaces. This information indicates that the virus can survive outside host persons for periods of 3 hours in air (as aerosol droplets), up to 2-3 days on steel and plastic surfaces, and on cardboard for 24 hours [31]. Similar, but broader research for related coronaviruses SARS and MERS, as well as certain strains of influenza have shown a ranges of persistency for these viruses that range from hours to days with many of the differences due to the volume of liquid, type of surface, and environmental conditions [32]. In general, the majority of airborne respiratory viruses, which require a host and liquid media to survive, are more likely to remain viable on hard surface than a porous, absorptive surface because the textile or other material draws moisture available from the liquid media containing the virus [33].

General guidance:

- Understand that cleaning removes soils and liquids and there are differences in sanitization versus disinfection.
 - Sanitization reduces the number of microorganisms (e.g., bacteria, viruses) to a safe level, generally defined by the U.S. Environmental Protection Agency as 99.9%.
 - Disinfection kills or inactivates all microorganisms as indicated on the specific label or the product (typically to 99.9999%).
 - It is important that cleaning be performed along with either sanitization or disinfection as appropriate for the PPE item.
- Ensure that PPE is thoroughly cleaned and sanitized or disinfected prior to reuse using procedures and cleaning agents, sanitizers, or disinfectants that do not degrade the protective performance of the PPE item.
 - For example, the use of highly concentrated bleach solutions (>10%) was observed during PPE use in West Africa for the Ebola Outbreak during 2014 to 2016 to render certain PPE items non-functional following multiple applications.
- Handle all contaminated PPE using examination gloves.
- Isolate contaminated PPE items to prevent cross contamination of other items or individuals until the affected items can be properly cleaned.
- Wherever possible, refer to manufacturer cleaning and sanitizing/disinfecting instructions and seek advice from the manufacturer on appropriate cleaning agents, sanitizers, or disinfectants, and processes if not addressed in the instructions.
 - Some cleaning agents, sanitizers, and disinfectants are not appropriate for certain PPE items depending on the materials of construction and their intended use (e.g., a floor cleaner is likely not suitable for PPE).
 - Where possible, use EPA-registered sanitizers or disinfectants.
- Inspect PPE items after cleaning, sanitization, or disinfection prior to reuse for ensuring item is in suitable, serviceable condition.
- If effectiveness of cleaning, sanitizing, or disinfecting PPE is uncertain, do not reuse items.



For certain disposable respirators and other clothing items:

- Judiciously consider any reuse of single-use PPE carefully taking into account the level of exposure (duration and type of patient contact) and any observed contamination.
- Products that have been observed to be directly exposed to any aerosol or liquid contamination should not be reused under any circumstances. Some types of disposable PPE may be reused, given limited supplies, but this comes with the risk of remaining viable virus that can still be infectious during the reuse [34].
 - One study indicated that reaerosolization of surrogate virus from the wearer coughing inside already contaminated N95 filtering facepiece respirators was negligible [35].
- Where supplies of protective garment are exhausted, certain disposable clothing items that has not be subject to extensive contamination may be decontaminated by turning clothing inside out, spraying a suitable decontaminant solution (e.g., alcohol in water) onto interior side of clothing, and hanging the clothing to air dry.

For reusable respirators:

- Limited studies have shown the effectiveness of being able to clean and sanitize elastomeric facepieces and related respiratory equipment [36, 37].
- Do not use steam sterilization (autoclaving), ethylene oxide sterilization, or any process involving harsh chemicals.
- Follow manufacturer instructions for guidance on cleaning and disinfection, particularly as related to the use of specific cleaning agents and wash water temperature.
 - Generally, certain components such as textile-based straps must be removed before cleaning and cleaned/sanitized separately.
 - Filters are also removed from the respirator before cleaning, but may have the exterior wiped down with a disinfecting wipe.
 - Any disposable elements such as hoods for PAPRs should be removed and discarded.
- In the absence of detailed instructions, follow the Occupational Safety and Health Administration (OSHA) general instructions provided at: <https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.134AppB2>

For reusable goggles or faceshields:

- Follow manufacturer procedures for specific item if provided.
- In absence of instructions, hand wash item in warm water with a suitable detergent and EPA-approved disinfectant following the specific instructions for its use and checking that the disinfectant can be used on the item with the manufacturer.
 - One recommended approach involves soaking the item in a 0.5% bleach solution for 30 minutes followed by multiple rinsing and allowing the item to air dry [38].

For reusable garments:

- For many forms of clothing, relatively high wash temperatures ($\approx 160^{\circ}\text{F}$) in combination with bleach are recommended for sanitization of the clothing [39]; however, these conditions may be not be appropriate and achievable for many types of protective clothing.



- Launder garments in accordance with garment manufacturer's instructions using the warmest temperature permitted.
 - Also use a laundry additive sanitizer with EPA registration.
- For certain types of complex reusable clothing, such as firefighter turnout clothing, refer to NFPA 1851 for specific cleaning instructions [40].
 - Use a combination of specialized cleaning with a wash temperature of 140°F in combination with a suitable sanitization procedure, either a launder sanitizer additive, or a process that is demonstrated to achieve sanitization as verified using procedures in the standard.

DECONTAMINATION AND DISINFECTION PROCEDURES FOR FIRST RESPONDERS INVOLVED IN COVID-19 CASES

It may be possible for a person to get COVID-19 by touching a contaminated surface or object and then touching their own mouth, nose, or eyes. While inhalation is thought to be the main form of viral spread, cross-contamination is another serious consideration.

Initial research efforts on COVID-19 have demonstrated that the virus was detectable in aerosols for up to three hours, up to four hours on copper, up to 24 hours on cardboard, and up to three days on plastic and stainless steel [41].

Considerations for Selecting a Disinfectant

Operational considerations for selecting a chemical disinfectant include:

- Broad spectrum activity without toxicity
 - Choosing a solution specific to COVID-19 claims is excellent as a short-term solution and allows for a broader selection of disinfectants; an enduring solution will be a material suitable for destruction of C. diff, MRSA, and corona viruses
- Rapid action, even at low concentrations
 - Follow manufacturer label for minimum dwell time. If in doubt, wait at least 10 minutes
 - Surfaces must remain wet with disinfectant for entire duration of dwell time
- Resistance to inactivation by organic matter
- pH neutral (between 5 and 9 at the extremes) so that the material can safely be used on turnout gear, work uniforms, and sensitive equipment
- Penetration of inanimate surfaces to sustain persistent action
- Low odor
- Affordability (Calculate the cost per gallon to utilize)
- Availability
- Multi-year shelf life
 - Dry materials have longer shelf lives, but require water to be added
- Pot life for materials that are mixed
 - Determine how long a solution can remain suitable for use once mixed in container
 - Pot life can vary from hours to days.
- Simple to mix and use
- Logistics
 - Dry pouches and tablets are easier to store and to move large quantities



- Disinfectants that will be used in kitchens or food preparation areas should have FDA or NSF food-safe approval

EPA-registered materials approved for use against the SARS-COV-2 can be found at:

<https://www.epa.gov/pesticide-registration/list-n-disinfectants-use-against-sars-cov-2>.

Considerations for Employing Electrostatic Sprayers for Application of Disinfectants and Decontaminants

Operationally, a solution is pulled through the spray nozzle where turbulent air flow shears off droplets into small, reproducible sizes. Electrostatic sprayers apply a positive charge to the decon solution in the reservoir, at the nozzle, or both. Because the droplets exit the sprayer system with a positive charge, they repel one another enroute to the surface to be decontaminated. This results in an even distribution of decontaminant across the surface and a “wrapping” effect where the spray wraps around multiple sides of an object and into hard to reach areas. The forces attracting the positively charged droplet to its target (most surfaces are either negatively charged or neutral) are approximately 75 times the force of gravity! This minimizes runoff by reducing the chance of droplets aggregating and then falling to the ground as seen with traditional sprayers. Regardless of the decontamination application technology that you use, remember that best practices need to be adhered to...it’s not magic, it’s a tool to provide enhanced decontamination efficiency.

Studies by the USA Environmental Protection Agency have demonstrated that electrostatic decontamination methods are more efficient, reduce waste, and deliver a more uniform distribution of liquids over uneven surfaces [42]. The EPA found that electrostatic backpack sprayers used 75x less decontaminant than the traditional backpack sprayers [42]. The study also demonstrated that the electrostatic sprayer had double the efficacy against biological agents due to the minimal amount of runoff moving spores prior to their deactivation [42].

- When determining if the addition of an electrostatic sprayer is suitable for your department, remember to investigate contaminant efficacy, cross-contamination potential between personnel and equipment, spread of threat material beyond warm zone, and liquid waste generation. These must be balanced against the increased cost, training, and maintenance required for electrostatic sprayers when compared to conventional sprayers.
- There are many products on the market today for electrostatic decontamination ranging from handheld to backpack-mounted to man-portable to transportable. While the handheld and backpack systems offer great flexibility, they also tend to get heavy when filled with decontamination solution for extended periods. It might make more sense to use the smaller systems for decon line operations and small area decontamination while the large systems would be beneficial for large area decontamination and vehicle decontamination.
- Be sure to validate that the system is compatible with your chosen decontamination solutions.
- If you have problems with your electrostatic sprayer, general points of failure are:
 - The nozzle (remove and realign to ensure not offset; ensure no residue buildup)
 - The circuit board (measure voltage across nozzle with voltmeter).

Considerations for Cleaning and Disinfecting Ambulances



- Cleaning refers to the removal of germs, dirt, and impurities from surfaces. Cleaning does not kill germs, but by removing them, it lowers their numbers and the risk of spreading infection.
- Disinfecting refers to using chemicals to kill germs on surfaces. This process does not necessarily clean dirty surfaces or remove germs, but by killing germs on a surface *after* cleaning, it can further lower the risk of spreading infection.
- After transporting the patient, leave the rear doors of the ambulance open to allow for air movement to reduce and remove potentially infectious particles.
 - The time required for one complete air exchange in a standard size ambulance using passive ventilation (low wind conditions) is approximately 10 minutes or 6 air changes per hour (ACH). This correlates to 90% efficiency in 23 minutes, 99% efficiency in 46 minutes, and 99.9% efficiency in 69 minutes [43].
- When cleaning and disinfecting the vehicle, appropriate personal protective equipment should be employed.
- Soiled surfaces must be cleaned prior to disinfection.
- Following routine cleaning, an appropriate EPA-registered disinfection product should be applied to all surfaces with special attention to “high-touch” areas, including the stretcher. The disinfection product should remain in place on all surfaces for the contact times indicated on the product’s label.
 - EPA-registered materials approved for use against the COVID-19 can be found at: <https://www.epa.gov/pesticide-registration/list-n-disinfectants-use-against-sars-cov-2>.
 - Consider employing an electrostatic sprayer for applying the disinfectant to allow for complete coverage of exposed surfaces.
- Medical equipment (stethoscope, BP cuff, etc.) making patient contact should be disposable or cleaned and disinfected before use on another patient.
- Consider disinfection of adjacent areas as needed based on air flow.
- Don’t forget to pay special attention to high touch areas such as:
 - Work benches/surfaces
 - Stretcher
 - Rails
 - Control panels and switches
 - Seats, seat belts and buckles
 - Floors, walls, and cabinets
 - Medical bags
 - Area surrounding medical waste bins and sharps containers

Considerations for Disinfecting Fire Apparatus

According to NFPA statistics, 64% of fire department calls in 2018 were for medical aid [44]. This trend will likely continue and increase with the current COVID-19 pandemic.

In addition to disinfecting apparatus as needed post incident, consider establishing a procedure to ensure apparatus are disinfected daily as part of apparatus checks/inspections.

- Using an EPA-registered disinfectant, apply to all surfaces in the apparatus with special attention focused on high-touch areas.
 - Seat belts and buckles
 - Door handles and grab rails



- Compartment handles and latches, especially compartments that house EMS equipment
- Steering wheel
- Switches, including parking brake and light/siren controls
- Mobile data terminals
- Arm rests
- Floors
- Medical bags
- Pump handles/levers, including routinely used levers like recirculate valves
- Vehicle keys for light duty vehicles
- Accountability tags and boards

Considerations for Cleaning and Disinfecting Fire Stations

This is just a reminder of best practices that should be employed regularly in the fire stations due to potential contacts with infectious agents such as MRSA and C. diff which are much more persistent and prevalent than COVID-19.

Consider establishing a procedure to ensure fire stations are fully disinfected daily as part of routine station cleaning. If a private contractor is used for cleaning service, consider coordinating with the contractor to ensure disinfection occurs as part of the cleaning duties.

For staff or office positions, considering developing a procedure for each person to conduct routine disinfection of their workspace.

Standard sanitation steps apply, including:

- Hand washing BEFORE entering the living quarters
 - Do not share towels; consider using paper towels during pandemic
- Add hand sanitizers or skin barrier product dispensers at all entry points between the apparatus bays and the living quarters
- Minimize bringing civilians into living quarters
- Clean and disinfect targets surfaces (high touch)
 - Kitchen tables, counters, and appliances
 - Bathroom counters, sink handles/knobs, and toilet/urinal handles
 - Door handles/knobs
 - Light switches
 - Fitness equipment
 - TV remotes
 - Armchair rests
 - Desks
 - Computer keyboards
 - Beds and carpeting
 - Soap dispensers
 - Elevator control buttons
 - Physical fitness equipment
- Clean dirt and debris off work boots and disinfect walking surfaces. Leave boots outside the living quarters.



- Launder work clothes at the fire station OR have it dry cleaned. It should not be worn to and from home and the station.
- For future fire station planning, avoid the use of carpets and furniture with cloth coverings.

Considerations for Waste Management

- Medical waste should be managed in accordance with routine procedures. There is no evidence to suggest that facility waste needs any additional disinfection [45].
- All medical waste produced during the care of COVID-19 patients should be collected safely in designated bags, treated, and then safely disposed of, or treated, or both, preferably on-site. If waste is moved off-site, it is critical to understand where and how it will be treated and destroyed.
- All who handle health care waste should wear appropriate PPE [46].

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