Marine Search and Rescue COVID-19 Information Package

Canadian Coast Guard Western Region
Search and Rescue Programs
Updated: 08-10-2020

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Introduction

For marine first responders, there can be various hazards associated with operating in the marine environment and functioning in a Search and Rescue (SAR) capacity. Whether it be specifically relating to the environmental conditions or the nature of the task at hand, crews are required to identify hazards and assess risk during any operation. With the COVID-19 pandemic, an additional dimension of risk has been introduced to responders which without careful investigation, can be difficult to identify and has consequences not immediately experienced. As a result, crews responding to SAR incidents are now required more than ever to take their time, exercise caution, and take additional precautions to ensure the safety of the crew while assisting the public.

The purpose of this document is to provide personnel with an informational resource on infectious disease considerations while responding to marine SAR incidents during the COVID-19 pandemic. Much of the content included in this document had originally been developed as part of the Canadian Coast Guard (CCG) Western Region COVID-19 Training with the target audience being CCG Rescue Specialist personnel. Although this is reflected in some of the content, it is important for all marine SAR partners to have an understanding of infectious disease considerations taken while responding to marine SAR incidents.

Infectious Disease

According to the World Health Organization (WHO) (n.d.), infectious diseases are caused by organisms (e.g., bacteria, viruses, parasites, etc.). Although many harmless organisms live in and on our bodies, some organisms can cause disease (WHO, n.d.). Infectious diseases can be transmitted in a variety of ways, referred to as modes of disease transmission. The British Columbia Centre for Disease Control (BCCDC) (2020a) describes two modes of disease transmission below:

> “Droplet Contact: some diseases can be transferred by infected droplets contacting surfaces of the eye, nose, or mouth. For example, large droplets that may be visible to the naked eye are generated when a person sneezes or coughs. These droplets typically spread only one to two metres and quickly fall to the ground. Influenza and SARS are two examples of diseases capable of being transmitted from droplet contact” (BCCDC, 2020a).
>
> “Airborne transmission: This occurs when much smaller evaporated droplets or dust particles containing the microorganism float in the air for long periods of time. Transmission occurs when others breathe the microorganism into their throat or lungs. Examples of diseases capable of airborne transmission include measles, chickenpox and tuberculosis” (BCCDC, 2020a).

COVID-19 Transmission

As this reading is being generated, information regarding COVID-19 is changing daily. Organizations such as the BC Centre for Disease Control (BCCDC), World Health Organization (WHO), and the Public Health Agency of Canada (PHAC) are frequently updating their recommendations.

According to the Government of Canada (2020a), human coronaviruses cause infections of the nose, throat and lungs and are most commonly spread from an infected person through the following means:

- Respiratory droplets generated when you cough or sneeze (i.e., droplet contact);
- Close, prolonged personal contact, such as touching or shaking hands (i.e., droplet contact); and
- Touching something with the virus on it, then touching your mouth, nose or eyes before washing your hands (i.e., droplet contact) (GOC, 2020a).

The modes of disease transmission for human coronaviruses can be impacted by aerosol generating devices. For example, **aerosol-generating medical procedures (AGMPs) can transform respiratory droplets (i.e., droplet contact) into smaller aerosol particles (i.e., airborne), becoming suspended in the surrounding environment** (WHO, 2020a). These procedures include: noninvasive ventilation, cardiopulmonary resuscitation, and manual ventilation before intubation (WHO, 2020b).

According to the CDC (2020a), in relation to influenza, COVID-19 is spreading relatively easily from person-to-person. The ease of transmission and the potential consequences of the illness require vigilance in following the standard operating procedures and best practices established for infectious disease control (CDC, 2020a).

COVID-19 Symptoms

According to the BCCDC (2020b), the symptoms for COVID-19 resemble illnesses such as the flu and common cold which are also respiratory illnesses. These symptoms include but are not limited to **coughing, fever, shortness of breath/difficulty breathing, sneezing, sore throat, and loss of smell or taste**. Some individuals who become infected with COVID-19 may appear asymptomatic. Furthermore, people with COVID-19 may only exhibit mild symptoms, however, they can worsen suddenly over the course of a few days (BCCDC, 2020b).

Vulnerable Populations

According to the Government of Canada (2020b), some individuals are more at risk of getting an infection and developing severe complications due to their health, social and economic circumstances. Vulnerable populations include anyone who is:

- An older adult;
- At risk due to underlying medical conditions (e.g. heart disease, hypertension, diabetes, chronic respiratory diseases, cancer); and
- At risk due to a compromised immune system from a medical condition or treatment (e.g. chemotherapy) (GOC, 2020b).

In addition to screening questions, SAMPLE (signs and symptoms, allergies, medications, past pertinent medical history, last meal, events prior) can be used to determine the best course of action for patients and responders.

Prehospital Treatment

Prehospital treatment options for a patient under investigation (PUI) for COVID-19 may be similar to those experiencing respiratory distress. This includes oxygen therapy and treating for shock. According to the World Health Organization (2020a), aerosol-generating medical procedures (AGMPs), such as nebulizer treatment, puts first responders at an increased risk of exposure to droplet modes of infectious disease transmission. This is because aerosol-generating procedures can impart droplet infectious disease agents into smaller aerosol particles, becoming suspended in the surrounding environment (WHO, 2020a).

Hygiene

According to the CDC (2020d), clean hands are one of the most important steps individuals can take to avoid getting sick and spreading germs to others. Organizations such as the CDC have conducted studies to identify the most effective technique for handwashing. Using soap is an important step; in combination with friction, the surfactants in soap assist in lifting potentially harmful microbes away from skin. In addition, those who use soap typically scrub their hands more thoroughly, helping to further remove germs that could cause disease (CDC, 2020d). It is important to follow the handwashing technique established by organizations such as the World Health Organization.

Sanitizing, Disinfecting and Sterilizing

Sanitizing refers to the removal of gross contaminants and visible material using soap and water, preferably a hot soapy wash. This is appropriate for floatation garments such as personal floatation devices (PFDs) - disinfection using bleach is not appropriate for garments that provide floatation as it may negatively impact floatation integrity. If using mechanical means to wash floatation garments, use a front-load washing machine; garments are not effectively washed by top-loading washing machines.

Disinfection refers to the process of cleaning using chemical means such as a bleach solution in order to destroy bacteria. A useful tool to use when determining the desired concentration of chlorine solution is the BC Food Safe online bleach calculator. Bleach solutions should be made fresh each day. Smaller semi-porous medical items such as blood pressure cuffs should be soaked for 10 - 15 in minutes in bleach solution ensuring to rinse with fresh water and let dry before storing. Products such as disinfecting bleach wipes should not be used to sanitize skin. Additional hard-surface disinfectants and hand sanitizers for use with areas which are suspected to be contaminated are available on the Government of Canada website.

Sterilizing refers to elimination of 100% of all forms of life and biological agents from an object or surface. This is typically achieved through use of an autoclave or special chemicals, typically conducted in a hospital setting.

COVID-19 Screening

When practicable, Marine Communications and Traffic Services (MCTS)/Joint Rescue Coordination Centre (JRCC) will attempt to carry out screening prior to the tasking phase. However, the **responding Search and Rescue Unit (SRU) should still always conduct its own on-scene screening** upon making initial contact with the patient/subject vessel. This is especially important if there is incomplete information, a need to validate initial screening information, or a lack of initial screening all together.

By conducting on-scene screening, the SRU will be able to better identify the level of risk associated with COVID-19 that is present as well as potential mitigative or preventative controls which are necessary to ensure safety of the crew. Furthermore, the SRU should update MCTS/JRCC of any potential PUI identified during screening to ensure that other assets involved in the response effort can take necessary precautions.

Screening questions should be directed to the patient or the master of the vessel prior to any boarding or contact involving the subject vessel. Below is a set of questions currently utilized by CCG personnel during on-scene screening.

1.1 What are the concerning signs or symptoms? Do they fall within known COVID-19 Symptoms?

a. Fever alone (37.5 °C and above) or in combination with any of the following

i.Cough (new/recent)

ii.Difficulty breathing or shortness of breath

1.2 Has the patient travelled from or transited through a location with confirmed COVID-19 in the past 14 days?

1.3 Has the patient been in close contact (respiratory fluids contact possible) with a suspected case of COVID-19 or close contact with someone who has travelled from or transited through a location with confirmed COVID-19 in the past 14 days?

In cases where the nature of distress does not necessarily involve a sick or injured person, it is still recommended to conduct a variation of these questions and utilize appropriate PPE before providing assistance.

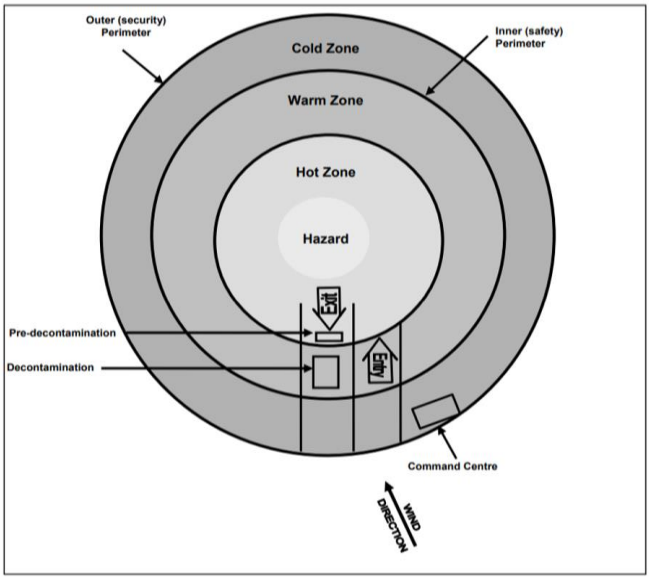
Hazard Zones

According to the Public Safety and Emergency Preparedness Canada (p. 45, 2008), first responders can utilize "HOT-WARM-COLD" hazard zones to define personal protective equipment requirements appropriate to exposure of contaminants. These zones are defined as follows:

- "**The HOT Zone** is the area where the contaminant concentration is deemed to be sufficient to cause death or injury to unprotected personnel or responders employing inappropriate PPE. The pre-decontamination area is located at the designated exit area of the Hot Zone".

- "**The WARM Zone** is the area where decontamination of personnel and equipment occurs. The Warm Zone is critical as it contains control points that prevent the movement of contaminated casualties and equipment into the Cold Zone. The Warm Zone is also a staging area for equipment required in support of Hot Zone activities. The main decontamination facility is located at the egress point of the Warm Zone".

- "**The COLD Zone** is a designated clean area with controlled access where the command centre and other key administrative (e.g., decontaminated casualty control) and logistical (e.g., transport) support areas are located".



In the dynamic marine SAR environment, given the size and type of a SRU as well as the subject vessel and transport requirements for a PUI, the boundaries between each hazard zone will change as the incident unfolds. SAR crews should endeavor to understand the underlying mechanisms for transmission and contraction of COVID-19 to adapt and modify the principles of hazard zone methodology.

Infectious Disease PPE (Personal Protective Equipment)

Starting with risk assessments conducted at appropriate intervals and exercise of infectious disease tactics, the risk of contraction or transmission can be effectively mitigated. **For interactions with PUIs and members of the public, ensuring that they are wearing a surgical mask** or equivalent will assist to provide source control of infectious agents. In these same situations, **N-95 masks or equivalents which protect the user from inhaling droplets containing infectious agents such as COVID-19 should be worn by responding personnel**. For the lead responder entering a HOT Zone, PPE for droplet modes of disease transmission might include:

- Tyvec suit
- Nitrile gloves
- Safety goggles or safety glasses
- N-95 mask or equivalent (for the responder)
- Surgical mask or equivalent (for bystanders and PUIs)
- Rubber boots
- Face shield
- Dry suit

A reduced arrangement of PPE for personnel assisting the lead responder in the WARM Zone, not coming into direct contact with a PUI, might include:

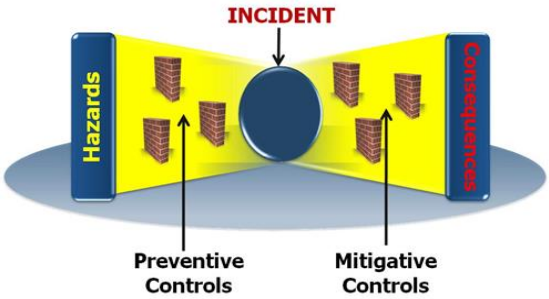
- Nitrile gloves
- Safety goggles or safety glasses
- N-95 mask or equivalent (for the responder)
- Face shield
- Dry suit

Responding personnel entering and exiting hazard zones should ensure they follow proper PPE donning and doffing procedures with **added vigilance when doffing PPE;** this is the point at which responders are most fatigued and thus more likely to rush or make mistakes leading to contraction or transmission of the virus.

Please refer to the PPE donning/doffing video (Appendix A) and list of procedures (Appendix B) created by the CCG COVID-19 training team for further information regarding the donning and doffing of infectious disease PPE.

Risk Assessment

According to the International Maritime Organization (IMO), risk is defined as “the combination of the frequency and the severity of the consequence” (IMO, 2018). In order to maintain operational safety**, SAR crews must systematically identify, assess and reassess risks**. A risk assessment examining response to an incident should capture hazards, consequences and necessary preventative and mitigative controls (see bowtie diagram below).



According to the IMO, hazard is defined as “a potential to threaten human life, health, property or the environment” (IMO, 2018). Using the bowtie methodology diagram above, if the incident (at the centre of the diagram) is a marine SAR tasking involving a PUI, potential hazards to a responding SAR crew include PUIs, their immediate environment as well as individuals who have been in contact with the PUI. Infectious disease hazards are especially dangerous because, without careful investigation, they are difficult to identify. In addition, the consequences of contraction or transmission can be latent or delayed, not experienced until much later after exposure.

In the risk assessment process, once hazards and consequences are identified and understood by all team members, crews can explore preventative and mitigative controls to keep risk at acceptable levels. **Preventive controls** include training, work instructions, and substitution of action or procedure (e.g., escorting or towing a subject vessel with a PUI rather than transporting them aboard a SRU). **Mitigative controls** include use of PPE (i.e., use of infectious disease PPE) and creation of emergency plans (e.g., isolation plan for transporting PUIs aboard SRUs). For an incident involving infectious disease protocols, the sequence of risk assessments might include:

1. GAR (green-amber-red) risk assessment during pre-departure checks;
2. SAP (stop-assess-plan) risk assessment directly outside the event zone; and
3. HEMPPA (hazards, environment, mechanism of injury, persons involved, PPE and additionally required resources) risk assessment before entering a scene to provide patient care.

Due to the nature of infectious disease hazards and delay in the experience of consequences associated with infectious disease, crews must make an effort to conduct formal risk assessments at each step of an incident, reassessing when and where required. Please refer to attached reference material regarding risk assessment (Appendix C).

Preparation

In preparation, SAR crews should ensure that their vessels are equipped with sufficient PPE and that they have reviewed measures to mitigate or prevent risk of exposure while responding to marine SAR incidents. This might include:

1. Verifying fit, adequate quantity and stowage of infectious disease PPE
2. Crew familiarization of COVID-19 screening procedure and application of PPE
3. Review of tactics to mitigate or prevent risk of infection during SAR calls

Infectious Disease Tactics

Limiting or eliminating exposure to PUIs as well as their immediate environment is the best tactic in mitigating or preventing contraction or transmission of infectious disease. This can occur in many different ways throughout the stages of an incident. For example, an alert and stable PUI who can be adequately assessed and monitored can be isolated in-place during transport to a higher level of care to eliminate risk of exposure to additional SAR crew members. This might include a communications schedule while escorting a subject vessel containing the PUI to the closest port for controlled disembarkation and handover to EHS.

Conclusion

In order to maintain safety of crewmembers while responding to marine SAR incidents during the COVID-19 pandemic, crews should implement risk assessments, hazard controls, and careful planning whenever assisting members of the public. Systematic risk assessments as well as on-scene COVID-19 screening will help guide responding personnel on which mitigative and preventative controls are necessary to keep personnel safe. Understanding appropriate PPE requirements when interacting with a potential PUI for both responding personnel as well as patients and bystanders will mitigate risk. Furthermore, preventative tactics such as limiting or eliminating exposure to a PUI and their environment by isolating and escorting a patient in-place to a higher level of care will provide the highest level of safety to responders.

Appendices

Appendix A

CCG COVID-19 Training Video Links

(Video player works best with Google Chrome)

PPE Donning/Doffing Procedure for Droplet Infectious Disease Modes of Transmission:

https://vimeo.com/408980969

(Password: CCG)

Scenario Involving Protocols for Droplet Infectious Disease Modes of Transmission:

https://vimeo.com/408490086

(Password: CCG)

Appendix B

CCG COVID-19 Training PPE Donning and Doffing Procedures

Preamble

Personnel who could be involved in scenarios requiring infectious disease personal protective equipment (PPE) should ensure they have the correct quantity and size of the required PPE, inspecting all items for deficiencies. PPE for individuals who will be in contact with patients under investigation (PUIs) who are suspected to be infected or contaminated:

1. Tyvek Suit
2. Two sets of nitrile gloves
3. Safety goggles or safety glasses
4. N95 mask or equivalent
5. Rubber boots
6. Duct tape
7. Surgical mask or equivalent to provide to patients and bystanders
8. Two large garbage bags for contaminated PPE
9. Disinfecting wipes or equivalent
10. Soap, water and face cloth for cleaning your hands and face

PPE for assistants who will not be in direct contact with the PUI or contaminated environments, includes:

1. N95 mask or equivalent
2. Safety goggles or safety glasses
3. One set of nitrile gloves

Donning Procedure

Step 1: Confirm personnel are fit for duty, including:

1. Clean shaven (same day) or trimmed facial hair for proper mask fit
2. Hydrated and fed
3. Bodily functions voided
4. Generally well and confident

Step 2: Confirm the correct quantity and size of the required PPE, inspecting all items for deficiencies.

1. Ensure mask users are clean shaven
2. Confirm N-95 or equivalent is appropriate for pathogens
3. Inspect the Tyvek suit or equivalent for appropriate size and damage
4. Inspect gloves for fit and damage
5. Confirm an ample quantity of duct tape
6. Inspect safety goggles or glasses for correct fit and damage
7. Confirm ample quantity of disinfecting wipes
8. Inspect rubber boots for size and fit

Step 3: Don PPE

1. Remove jewelry and/or sharp objects
2. Remove boots and put on the Tyvek suit, do not put on the hood
3. Step into rubber boots
4. If the Tyvek suit does not have built in feet, the bottom of the legs should be positioned on the outside of the rubber boots, approximately 2 inches from the top of the boot. Seal using duct tape, creating a tab for easy removal. If boots are built-in, taping is not necessary
5. Put on nitrile gloves under the Tyvek suit. Put on an additional pair one size larger over the suit and seal with duct tape. Once again, create a tab for easy removal.
6. Place a 2 foot strip of duct tape down the Tyvek suit along the zipper flap. This will help to ensure that the zipper stays in place. Once placed, create a tab for easy removal.
7. Put on the N-95 mask pinching the nose bridge to ensure a good seal. Position the straps to create an X-pattern before the ear.
8. Put on the safety goggles or glasses.
9. Put on the Tyvek hood.
10. Use your assistant to tape the back of the Tyvek hood to ensure correct positioning on your face.
11. Finally, complete a head to toe ‘buddy check”, inspecting the donned PPE for proper fit or inconsistencies.
12. Don additional required PPE such as a PFD.

Doffing Procedure

Step 1: The assistant, ready in gloves, mask and goggles, should flatten two garbage bags in the warm zone where it borders the cold zone. One is for reusable PPE the other for disposable PPE. The assistant will also require the following items:

1. Disinfecting wipes or bleach solution
2. Soap and water
3. Washcloth for face and hands

Step 2: Doff PPE

1. Walk to the edge of the warm zone where it borders the cold zone.
2. Step inside one of the two flattened garbage bags.
3. Turn around, facing away from the assistant in the cold zone.
4. Wipe yourself off with disinfecting wipes, putting the soiled wipes at your feet.
5. Remove additional Personal Protective Equipment, placing it in the garbage bag dedicated to reusable PPE.
6. Remove the duct tape securing your gloves to the Tyvek suit and place at your feet.
7. Carefully remove the first set of gloves and place at your feet.
8. Wipe your hands.
9. Slowly take down the hood.
10. Wipe your hands.
11. Remove the duct tape sealing your boots to your Tyvek suit.
12. Wipe your hands.
13. Remove the zipper tape and place it at your feet.
14. Wipe your hands.
15. Slowly unzip the Tyvek suit.
16. Wipe your hands.
17. Carefully remove the suit by rolling it down your body.
18. Step backwards out of your boots into the cold zone towards the assistant.
19. Wipe your hands.
20. Close your eyes and remove your goggles, placing them in the garbage bag with reusable PPE.
21. Wipe your hands.
22. Grasp the N-95 mask straps. Closing your eyes, exhale while removing the mask, placing it in the garbage bag for disposable PPE.

23. Wipe your hands and face using a damp cloth with soap and water.
24. Remove your gloves and place them in the garbage bag.
25. Wipe your hands.
26. Proceed to a shower properly.
27. The assisting crew member should ensure reusable PPE is in one garbage bag and disposable PPE is in another. Seal and label both garbage bags, ensuring disposable PPE is discarded appropriately.

Appendix C

Risk Assessment Tools

GAR (Green, Amber, Red)

The Green, Amber, Red (GAR) tool is used during the pre-departure before departing for a SAR tasking or operation. Based on the USCG's GAR Operational Risk Model, the Canadian Coast Guard has adapted the tool for use dockside or during the briefing before the commencement of an operation. As the crew goes through each aspect of the PEACE table, all crew shall respond with a thumbs up GREEN, thumbs to the side, AMBER or thumbs down RED. Any RED or AMBER items will be identified and rectified before departure.

Crew	**P**ersonnel	Manning, PPE, Qualifications, Injuries, Health, Skills, Fatigue, Confidence
Craft	**E**nvironment	Weather Forecast, Sea Temps, Sea, Swell and Current, Local WX effects, Vessel limits, Light, Area Dangers
	Assets/Vessels	Vessel is capable, mission appropriate, seaworthy, inspected/certified, equipment present and working, navigation, comms, safety equipment, mechanical, lights, fuel
Mission	**C**ommunications	Channels, Phone #s , Key Commands and Signals, Operational Plans
	Event	Planning, Objectives, Safety Plans, Schedule, Speed, SOPs, Standing Orders, Search Plans

SAP (Stop, Assess, Plan)

To help maintain operational safety, SAR crews must be able to systematically assess risk and develop rescue plans that minimize it. The first step in developing a viable plan is to carefully observe the scene. The SAP assessment method provides a simple 3-step guide to help SAR crews quickly identify operational hazards and determine rescue event opportunities.

Stop – Stop outside of the event zone (approximately 100 feet away from the incident scene or far enough where rescuers cannot become impacted or distracted by the event) to enable the crew to observe the entire incident scene carefully before becoming involved.

Assess - Crew members observe the scene, reporting their observations to the unit leader.

- What is the most significant danger or threat to the rescuers, survivors, and bystanders?
- Is your SAR Unit capable, equipped and crewed to safely perform the rescue?
- Is your unit capable of safety providing the necessary medical attention?
- Will any additional expertise or equipment be needed?

Plan – After discussing all observations and potential hazards, the crew discusses the most effective plan with the priority being the safety of the responding crew and craft. Once a plan is decided, the leader assigns jobs and gets verification from the crew, MCTS/JRCC can be notified of the SRUs intentions and an approach can be made.

HEMPPA
(Hazards, Environment, Mechanism of Injury, Persons Involved, PPE, Additionally Required Resources)

As part of the rescue scene evaluation and after an initial SAP risk assessment has been conducted, responders will go through HEMPPA to ensure scene safety and identify any other considerations that need to be taken prior to providing patient care.

Hazards

Check for hazards to yourself, patients and bystanders. Although many hazards are visible and easily identified, those associated with infectious disease are not and will require mitigative and preventative controls to ensure safety of responding personnel.

Environment

If the environment is unsafe or unstable, can you control, manage or correct it? If not, do not enter. In marine search and rescue, it is not uncommon for rescuers to be presented with unstable environments. Always keep in mind that the safety of your crew and craft is paramount in any circumstance.

Mechanism of Injury (MOI)

Determining the MOI can indicate the severity and/or the transport priority of the patient. Often a significant MOI will indicate whether additional assets are required to assist in providing patient care.

Persons Involved

If possible, confirm how many casualties are involved in the incident. It should be determined as early as possible whether the number of casualties will overwhelm the responding Search and Rescue Unit (SRU) and if additional resources are required.

PPE

Are responders wearing appropriate personal protective equipment to effectively mitigate hazards associated with infectious disease? In addition to responders donning appropriate PPE, providing a surgical mask or equivalent to casualties and bystanders will assist to provide source control of infectious agents.

Additionally Required Resources

When required, requesting additional resources early on will increase the likelihood of the incident resulting in a positive outcome. This is especially important in circumstances where crews have identified a possible Person Under Investigation (PUI) for COVID-19 and cannot themselves effectively mitigate or prevent risk of transmission to their crew.

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