Delivering Safe Emergency Social Services as a Host Community during a Pandemic

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Abstract

Emergency planners face considerable challenges when planning for an evacuation, while in the midst of a pandemic. This two-fold emergency adds complexity because it requires considerable planning to achieve both simultaneous and conflicting objectives of limiting the spread of COVID-19 while also delivering emergency services. The City of Prince George (CoPG) provides Emergency Social Services (ESS) for not only their own residents, but also the multitude of communities located in the northern portion of British Columbia (BC). Mass evacuations, which requires the rapid removal of a large population from disaster-impacted areas, can also inadvertently accelerate the transmission of COVID-19. Investigating and implementing strategies that reduce the potential for virus spread while providing ESS, helps provide an increased margin of safety for evacuees, CoPG residents, emergency workers and volunteers. The following study is a review of practices used in evacuation centres and other similar purposed facilities, to reduce the spread of COVID-19 while providing essential services to a large population. These strategies were evaluated for applicability into the CoPG ESS plan. Elements of the research gained from the literature review that could increase safety for the CoPG's ESS plan are; transportation, advanced registration, dispersed evacuation, pre-screening, contact tracing, ventilation, maximizing the use of cleaning supplies and personal protective equipment (PPE), cleaning, education, and information campaigns. This study will make recommendations regarding how the CoPG can increase the safety of the ESS plan during the pandemic, reducing the transmission of the virus while providing host community services for neighboring communities.

Keywords: evacuation, evacuation centre, evacuation planning, reception centre, natural disaster, pandemic, COVID-19, isolation centre.

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Delivering Emergency Social Services as a Host Community during a Pandemic

Background

In 2017 and 2018 the City of Prince George (CoPG) acted as a host community for three months serving over 13,000 evacuees who were forced from their homes due to a mass evacuation caused by wildfires (Hall, 2019). These two considerable mass evacuation events have positioned the CoPG as a host community leader in the province of BC that can deliver large scale Emergency Social Services (ESS). After a brief hiatus from providing this service, and with the recent floods and current fire events, the CoPG is preparing to again offer this service to neighboring communities. However, the CoPG is currently confronted with the challenges of providing ESS for a mass evacuation, while the COVID-19 pandemic is ongoing.

Traditional evacuation centres often have common attributes such as crowded spaces, close contact settings and confined spaces that are known to contribute to the spread of the COVID-19 virus (Takaoka, 2021). Numerous studies indicate that evacuations can increase the rate of virus spread and infection (Collins et al., 2021; Sawano et al., 2021; Takaoka, 2021). With the ongoing COVID-19 pandemic and the upcoming fire season rapidly approaching, the CoPG is looking to identify pandemic safe strategies to improve the ESS delivery model for mass evacuations that may occur in fulfilling their role as a host community.

Research Question and Rationale

Effective evacuations are a critical component of public safety (Pei et al., 2020). Evacuations have been identified as having the potential to rapidly spread COVID-19 throughout a community. Once an outbreak occurs at an evacuation centre, it is difficult to contain (Takaoka et al., 2021). Adding further to this challenge, many of the people evacuating or utilizing an

evacuation centre consist of vulnerable populations, whom are highly susceptible to contracting the COVID-19 virus (Sawano et al., 2021; Whytlaw et al., 2021). Pei et al. (2020) argues that communities who develop plans and prepare for an evacuation during a pandemic reduce the overall detrimental impact to public health. This study will answer the following question: *What additional mitigation measures can the CoPG implement to their ESS planning that would improve safety for evacuees, CoPG residents and emergency workers?* This study aims to identify strategies that would create a safe environment to conduct ESS as a host city during evacuations and a concurrent pandemic, infectious disease outbreak or epidemic. The significance of this study and the results of the research will provide the CoPG emergency management professionals with an understanding of potential strategies that could be enlisted to mitigate virus spread. This in turn will add an increased safety margin, and achieve the double objective of providing ESS to evacuees from other communities, while simultaneously impeding the spread of COVID-19 during an evacuation.

Although there have been some studies and research conducted relating to this study area, it is limited as there has not been significant time since the onset of the COVID-19 pandemic. COVID-19 information is continually being updated and health guidelines remain in flux to accommodate the dynamic nature of the virus and its variants. Continual reassessment of best practices, health official directions and current research is critical to ensure that potential mitigation strategies reflect the current body of available knowledge. Given the limitations to the knowledge and understanding of the COVID-19 virus and its variants, the impact it has on evacuations is substantial. If emergency management professionals do not alter existing evacuation plans, they could be at risk of spreading the virus throughout their community or other neighboring communities.

Review of Literature

The review of literature included a comprehensive systematic search that focused on facilities facing similar challenges of delivering services while minimizing the spread of COVID-19. The objective was to identify critical knowledge gaps, along with identifying major themes relating to the study area and look for ways to modify and improve the current host community model utilized by the CoPG. The literature review included peer reviewed journals, case studies, briefing notes, and other sources that contained theoretical and practical perspectives. Identifying and analyzing the literature from comparable facilities produced considerable strategies that could be considered, adopted, or adapted into the CoPG host community ESS delivery plan.

Search Methodology

The initial search targeted a variety of sources and was conducted by limiting the literature to contain only the keywords: pandemic, COVID-19, evacuation, evacuation planning, evacuation centres, isolation centres and pandemic. These keywords were searched alone and in combination. To ensure a wide array of research was utilized from available sources there were numerous resources selected to conduct the topic search; JIBC Library, Google Scholar and Research Gate. All resources used provided a variety of articles that were considered for the literature review.

The initial search populated a large number of articles. Use of the keywords “pandemic in an evacuation” provided 10,100,000 hits on Google; 17,400 hits on Google Scholar; and 126 on the JIBC Library System. It was unrealistic to review all returned searches. Filters used to place restrictions on the search allowed for more refined and useable articles. Filtering the results to

articles containing “only with the exact phrase”, plus adding the keywords “full text” and “peer-reviewed” narrowed the results significantly and provided sources that were more relevant. This produced a more refined list with increasingly relevant titles, which were then given a quick abstract review before being added to a secondary list.

Article Selection

The secondary list of sources provided a more refined collection of articles. An examination of the title and abstract of each of these sources was then conducted to further ascertain relevancy to the research. The revised search criteria provided 18 articles; from these 18 a more thorough review was conducted to refine the list to 15 articles for a full and final review. All articles used were selected because they were peer-reviewed articles and full text. These articles were also selected based on the relevance to the research question, the research methodology and the themes that emerged based on the initial review.

Analysis

After reviewing the literature, several common themes surfaced which provided insight into challenges and potential solutions to accommodate the two-fold objective of providing ESS to evacuees while limiting the spread of the COVID-19 virus. Transportation, advanced registration, dispersed evacuation, pre-screening contact tracing, ventilation, maximizing cleaning supplies and personal protective equipment (PPE), systematic documented cleaning protocols, education and information were aspects of evacuations centre where strategies existed that could reduce virus spread while delivering ESS.

Transportation

The initial stage of an evacuation involves transportation away from the hazard to an area of safety. During an evacuation, transportation resources are in high demand and are commonly shared by evacuees and emergency responders (Borowski et al., 2021). The current pandemic decreases transportation opportunities such as ridesharing or mass transit due to the confined space and close quarters that are often present within these transportation modes. The Centre for Disease Control and Prevention [CDC] (2021) cautions that the risk of contracting COVID-19 drastically increases with time lengths greater than 15 minutes in areas that cannot sustain two-meter social distancing. During an emergency, considerable portions of the population evacuating may not have personal transportation and will rely on services provided or offered by others (Borowski et al., 2021). This is particularly relevant with vulnerable populations, as many of them do not have access to reliable transportation or critical emergency information to direct them during an evacuation (Campbell et al., 2021). Considerable caution is required to ensure that vulnerable sectors of the population such as elderly or medically compromised individuals are not placed at an increased risk due to transportation methods utilized to facilitate an evacuation (Borowski et al., 2021). Preble (2021) cautions that transportation can increase the rate of COVID-19 infection if there are frequent stops or passenger turn over. Evaluating transportation resources in advance of an emergency, during a pandemic is critical, because many public transit agencies will have reduced staffing levels in order to respond to the decreased demand in transportation brought on by restrictions (Campbell et al., 2021).

Guidance should be provided for those utilizing personal vehicles to promote COVID-19 safety measures. The guidance should include wearing face masks, using hand sanitizer, limiting stops and travelling with the windows open (Campbell et al., 2021). Aside from personal

vehicles, buses are a commonly observed transportation method communities use to rapidly reposition evacuees from their community to the host community. Strategies to reduce the spread of the COVID-19 virus on buses include reduced passenger capacity to allow for social distancing, loading the bus back to front and unloading front to back to reduce unnecessary contact, use of face masks, using the windows as passive ventilation and providing a bus monitor to ensure that safety protocols are being followed by all on board (Abulhassan & Davis, 2021; Shaheen 2021).

Advanced Registration

Advanced registration allows evacuees to register themselves before they reach an evacuation centre. The evacuee can go online prior to leaving home or during transportation and register themselves and their family, so that when they arrive to an evacuation centre they can immediately receive food, shelter and clothing services. This allows them to spend less time in the facility, reducing the risk of transmission, especially in those individuals with pre-existing health conditions or those that are currently diagnosed with COVID-19 (Whytlaw et al., 2021). Shadow evacuations are when people outside the evacuation zone self-evacuate (Campbell et al., 2021; Whytlaw et al., 2021). This can be problematic because it places stress on an already under resourced system and can unnecessarily promote transmission of the COVID-19 virus (Whytlaw et al., 2021). Advanced registration can also limit shadow evacuation by telling the evacuee registering that they are not eligible for ESS.

Dispersed Evacuation

In order to accommodate and promote social distancing measures required to combat transmission of the virus, a dispersed evacuation is recommended during an evacuation (Potutan & Arakida, 2021). Dispersed evacuation means that an enforced two-meter distance is present

between individuals. As noted by Potutan and Arkida, (2021) the implications of a dispersed evacuation means that evacuations can take longer and require more resources such as the need for the increased number of evacuation centres and transportation resources. A dispersed evacuation relies on earlier notification, increased number of evacuation centres and separation of presumptive or positive COVID-19 evacuees.

Increased numbers of evacuation centres are required in order to promote social distancing within the facility (Cambell et al., 2021; Potutan & Arakida, 2021; Sawano et al., 2021). Evacuation centres are typically designed to serve a large amount of evacuees in one area, and offer confined space and close contact settings (World Health Organization [WHO], 2020a). Numerous smaller evacuation centre sites are recommended to allow for the increased capacity requirements and promoting social distance requirements; however, this comes with a capacity reduction (Potutan & Arakida, 2021; Sakamoto et al., 2020). It is critical that these evacuation centres comply with the public health guidelines in order to reduce the spread of transmission (Pei et al., 2020). Tents, schools, sporting venues or community halls are all potential venues that could be used to accommodate the additional evacuation centres (WHO, 2020a).

COVID-19 Positive isolation Centres

In order to reduce the rate of virus transmission, a commonly suggested strategy was to identity and isolate individuals with suspected, probable, or confirmed COVID-19 (Takaoka et al., 2021; WHO, 2020a). This allows the healthy to be served at one reception centre while the individuals who have tested positive receive services and instructions at another. Whytlaw et al., (2021) does caution that separation of individuals who tested positive can add complications for family members and caregivers.

Pre-screening

Pre-screening evacuees before they enter an evacuation centre increases community safety and reduces potential transmission (Potutan & Arakida, 2021). Those displaying symptoms or having tested positive can be separated and receive services in a facility specifically designed for population that have tested positive (WHO, 2020a). Pre-screening was identified as a cost-effective strategy that reduced the mortality rates in designated isolation centres in South Africa (Reddy et al., 2020).

Contact Tracing

Contact tracing is a method of reconstructing possible exposures from an infection chain. Contact tracing has shown to be an effective countermeasure to preventing increased virus spread (Mansoor et al., 2020; Vardoulakis et al., 2020). Masoor et al. (2020) recommends recording name, home and office address, and phone number of those contacted during the tracing process. Wong and Shaheen (2020) and the WHO (2020a) both caution the importance of ensuring privacy and security of collected contact tracing information.

Ventilation

Increased air flow in both transportation and facilities has shown to be an effective preventive measure for reducing the spread of COVID -19 (Abulhassan &Davis, 2021; Campbell et al., 2021; Potutan & Arakida, 2021; Sakamoto et al., 2020; Vardoulakis et al., 2020). WHO (2020a) recommends the use of fans and temperature control for indoor facilities in order to reduce virus transmission rates. This promotes continual new air to enter the facility and limits the amount of time effectively airborne virus particulates can remain airborne in the facility (Vardoulakis et al., 2020; WHO, 2020a).

Maximizing PPE and Hygiene Supplies

Evacuation centre operations consume large amounts of supplies. The demand for critical supplies is further increased with the added stress of a pandemic. Cleaning and hygiene supplies are critical to combat the spread of communicable viruses and are often in short supply (Sakamoto et al., 2020). Lack of PPE has been identified as a considerable cause of infecting hospital and healthcare workers (Mansoor et al., 2020). This could indicate that evacuation centres could be prone to the same challenge. Numerous strategies were identified in the literature to assist in ensuring adequate supplies were available during an evacuation centre activation.

First, having adequate resources stockpiled in advance of an event helps to ensure the increased demand in resources does not exceed availability during an evacuation centres operation (Poutan & Arakida, 2020; Sakamoto et al., 2021). Each individual evacuation centre is responsible for acquiring the resources they require. Gloves, face masks, hygiene and cleaning supplies are in high demand during a pandemic. Stockpiling these critical items ensures that there are adequate resources available to accommodate the high demand on critical cleaning and PPE supplies needed for facilitating both the evacuation and the pandemic. Securing storage locations and maintaining a current inventory is recommended (Takaoka et al., 2021).

Secondly, the high demand for supplies makes it imperative to ensure that their usable lifespan is maximized. Educating staff and evacuees regarding the appropriate life cycle of PPE can greatly reduce the amount of consumed PPE and hygiene resources (Campbell et al., 2020; Mansoor et al., 2020).

A third strategy Mansoor et al. (2020) recommends is having staff do multiple tasks to limit the potential virus exposure and reduce the use of critical supplies. An example of this is

having a single staff member conduct numerous tasks such as cleaning and waste removal while wearing a single set of PPE. This allows one use of the appropriate PPE instead of a new set being used as each staff member dons or doffs equipment. Training staff on proper donning and doffing processes is critical to prevent the potential for self-contamination, as well as reviewing the proper disposal of PPE and hygiene supplies helps with the reduction of unnecessary waste and ensures that after its use and disposal it does not cause further issues of virus transmission (Mansoor et al., 2020).

Cleaning

Numerous studies argue the need for a thorough and systematic cleaning process in evacuation centres in order to reduce transmission (Takaoka et al., 2021; Vardoulakis et al., 2020; WHO 2020a; Whytlaw et al., 2021). The WHO (2020a) notes that alongside the normal environmental cleaning that occurs, high touch point surfaces need to be identified, inventoried and receive more frequent cleaning and disinfection. Registration areas, switches, washrooms, entrances and exits are areas of high concern for virus contamination (WHO, 2020a). These areas should have controlled access with separate exit and entrance points complete with supervisors who ensure cleaning is conducted hourly (CDC, 2017). The WHO (2020b) recommends using 70% ethyl alcohol for equipment between uses and 1% sodium hypochlorite for disinfection of regular touch surfaces.

Transmission of the COVID-19 virus is possible through waste (Vardoulakis et al., 2020). Trash receptacles should be readily available throughout the evacuation centre and emptied regularly. Waste from persons with confirmed COVID-19 is considered infectious and should be treated as biohazard waste (WHO, 2020a). Medical waste should be disposed of separately as per local regulation (Rebmann et al., 2008).

Education

The public tends to underestimate virus transmission (Campbell et al., 2021). Reducing virus transmission through education of the public is a critical strategy during an evacuation. Campbell et al. (2021) recommends maintaining synthesized information on an ongoing basis aimed at providing guidance for evacuees and workers. Hand hygiene and the proper use of face masks are critical for reducing the spread of the COVID-19 virus (Campbell et al., 2021; Vardoulakis et al., 2020). Accessible and functioning hand washing stations should be available throughout the evacuation centre located at the facility entry, exits, toilets and waste management areas (WHO, 2020b). To support the use of these key preventative measures, educating the public on the importance of the hygiene protocols is key, having posted easy to read directives on how to conduct proper hygiene practice appropriately is critical to ensure the effectiveness of these strategies is maximized (WHO, 2020a).

In order to reduce virus transmission, it is critical to educate the staff on communicable disease prevention. The increased resources and safety processes required to operate an evacuation centre during a pandemic requires increased personnel (WHO 2020a). Developing plans in advance to accommodate the communicable disease prevention strategies allow the staff to know what to expect and how to follow the prevention plan. A useful way to unify all staff is through the use of an operations manual, which could be integrated into the emergency plan (Takaoka et al., 2021). Training and exercises in advance of an event can help solidify these processes for ESS workers. Campbell et al. (2021) recommends that evacuation centre managers set compliance goals and reinforce education through periodic site checks.

Information

The willingness of the public to follow evacuation protocols and public health guidance directly impacts virus transmission (Campbell et al., 2021). Effective communication campaigns can assist the public in making appropriate decisions regarding protective actions. Communication campaigns typically involve the development and distribution of messaging on multiple platforms, educating the public on topics such as the status of the disaster, where to evacuate to, what to expect and what to bring (Collins et al., 2021; Takaoka et al., 2021). Using communication campaigns to improve public perception on the safety measures and precautions that are conducted at an evacuation centre can greatly increase the public's trust and promote evacuation centre usage (Collins et al., 2021). Furthermore, communication allows the evacuees to know the expected behavior and hygiene standards at the facility, so that they can behave appropriately. Campbell et al. (2021) cautioned that there is a potential for some hostility and skepticism from evacuees due to pandemic burnout, which could lead to evacuees being less receptive to following safety protocols. They recommended tailoring messages to reach specific audiences and leveraging community partners to assist in mitigating this type of circumstance.

During an evacuation, information is in high demand for evacuees, but many barriers such as literacy, access to technology, language and culture can prevent the correct information from reaching its intended targets (Whytlaw et al., 2021). Information that could be useful to evacuees includes advice on what to bring, expected hygiene and behavior protocols in the evacuation centre and where they should evacuate to (Takaoka et al., 2021). Sakamoto (2020) notes the importance of listing evacuation centres simultaneously to avoid any one evacuation centre from receiving a surge of evacuees.

Discussion

Integrating Strategies into Prince George ESS Planning

The CoPG has taken steps to meet the mandatory BC Provincial Health Officer guidelines while providing ESS. The evacuation centre site has been altered from its previous design to accommodate for social distancing, face masks, barriers, flow path, capacity control and utilizing the digital registration system in an attempt to reduce COVID-19 exposure risk. These mitigation measures are a good initial step towards mitigating the spread of the COVID-19 virus. From the research conducted in the literature review, there are additional strategies that could be integrated into the ESS plan in order to further improve the margin of safety for evacuees, emergency workers and the community.

Travel to the Evacuation Centre

Initially, when an evacuation order for an area is issued, an opportunity exists to educate potential evacuees on ways to reduce virus spread before they even set out from their home community. Key information that could be included in the evacuation order include transportation; advanced registration; evacuation centre locations; hygiene expectations and cleaning protocols. Messaging explaining the precautions and safety measures in place at evacuation centres could promote greater trust and increased usage of the evacuation centres.

Transportation guidelines, providing safety requirements for both personal and mass transit would promote a reduction in the spread of COVID-19. Drivers could be educated on the risk of COVID-19 spread and learn how to minimize this risk through tactics such as minimal stopping, social distancing, the appropriate use of PPE and using the air conditioning or opening the window(s) for passive ventilation (Campbell et al., 2021).

Instructions provided to the evacuees in advance of registration could also serve to reduce virus spread through minimizing the time the evacuee spends in the evacuation centre. This would also allow the host community to prepare in advance for the arrival of the evacuees, finding appropriate lodging and food sources.

Simultaneously posting the evacuation centre locations or specifically directing the evacuees to specific locations can help reduce virus spread through promoting dispersed evacuation. Numerous evacuation centres ensures that evacuees are distributed between the facilities reducing crowding and the associated risk of virus transmission.

Informing evacuees and residents on the precautions being taken at the evacuation centre can help reduce virus spread. The evacuation order could also contain instructions on the expected etiquette and safety procedures being conducted at the evacuation centre. This would help influence evacuee perceptions, encourage use of the evacuation centres, encourage social distancing, and using the correct PPE.

Evacuation Centre Operations

The evacuation centre operations provide another opportunity to implement strategies learned in the literature review and reduce the virus spread while delivering ESS to evacuees. Increasing the number of evacuation centre sites, pre-screening, contact tracing, maximizing PPE and cleaning supplies, cleaning procedures, education and information updates are areas where opportunity exists to decrease virus spread while providing ESS to evacuees (WHO, 2020a).

The CoPG currently utilizes a single site for an evacuation centre, but additional sites could be arranged in order to promote a dispersed evacuation and spread evacuee concentration. Outside sites, utilizing tents or existing infrastructure and mobile ESS could increase evacuation

centre sites. Numerous evacuation centre sites promote a dispersed evacuation and decreases COVID-19 virus transmission risk. It also offers the opportunity to separate those evacuees with a confirmed or suspected COVID-19 diagnosis (Takaoka et al., 2021). Operation of these sites will require increased human resources. The CoPG may have to partner with outside agencies such as the local health authority (Northern Health Authority and Provincial Health Services Authority – Health Emergency Management of British Columbia) and Non-Government Organizations (NGO's) (Red Cross and Salvation Army) in order to have sufficient resources.

Pre-screening evacuees and contract tracing can assist in reducing COVID-19 virus spread at evacuation centres. This process is not currently done, but could augment the current registration system at the entrance of the evacuation centre utilized for family member location and operational purposes. The screening questions will be asked, along with collecting individuals' temperature using a non-contact thermometer to ensure no obvious indicators of COVID-19 are present. Contact information will be collected as per existing ESS procedures to additionally assist public health officials in tracking down and reducing COVID-19 transmission and exposure to others.

Increasing ventilation or the free flow of air can serve to reduce the risk of contracting COVID-19. Three possibilities exist to incorporate increased airflow. The first opportunity is to utilize tents without walls to use as the reception centre. Secondly, utilizing passive ventilation as utilized with the opening of a vehicle window could increase airflow in an evacuation centre. This would involve utilizing natural wind current and opening entry and exit points. The third opportunity would be to utilize the heating, ventilation and air conditioning (HVAC) units or pressure fans to both blow air in and extract air out. This is a low-cost mitigation strategy that

could be employed at the current ESS centre as well as any additional facilities that are established.

Cleaning is a key strategy to reduce virus spread. Identifying common touch points as well as known high touch points and heavy use areas such as entrances, exits and toilets have been identified as infection transmission hot spots (WHO, 2020a). Regular systematic and documented cleaning can reduce virus spread at evacuation centres with minimal cost (Collins et al., 2020). Maximizing PPE and cleaning supplies that are in high demand ensures that the supplies are maximized for use. Educating staff on how to safely maximize the most out of the supplies is one way to ensure that supplies are available when needed and are not wasted unnecessarily. Currently, the CoPG has a rigorous cleaning strategy; however, documenting the process, so that it is visible for the public would enhance public perception, confidence and staff accountability (T. Spooner, personal communication, June 22, 2021).

Education and information campaigns can greatly enhance the public trust in an evacuation centre, as well as promote proper behavior and hygiene. Establishing a communication campaign early on in an evacuation can assist emergency management professionals by gaining compliance from the public and staff. Table tops and functional exercises can help reinforce and familiarize processes for emergency workers, as well as identify service or education gaps that may be present.

Evaluation and Recommendations

In light of the pandemic, increasing safety measures while conducting ESS in order to reduce the risk of spreading the COVID-19 virus is prudent because as noted by Takaoka et al., (2021) once an outbreak occurs at an evacuation centre it is difficult to control. The risks of conducting ESS as a host community while amidst a pandemic requires emergency managers to

continually seek out and implement the best practices available. Several strategies identified in the literature review for this study could be incorporated into the CoPG's existing ESS plan, providing maximum safety for evacuees, emergency workers and community residents. This study recommends that the CoPG take action at two stages.

The first is during the initial stages of the evacuation while the evacuees are preparing to leave and travel to the CoPG. Information and guidance could be provided to evacuees which could assist in mitigating communicable disease spread; transportation advice; advanced registration evacuation centre locations; hygiene expectations and cleaning protocols. The second stage is to consider implementing additional safety mitigation strategies while operating the evacuation centre. Strategies utilized by other evacuation centres and similar facilities include increasing evacuation centre sites, pre-screening, contact tracing, maximizing PPE usage and minimizing the waste of cleaning supplies. Enhanced and systematic cleaning procedures, education and information campaigns are areas where opportunity exists to decrease COVID-19 virus spread. Planning and partnering with the local healthcare authorities could assist operations of an evacuation centre as their expertise is in contract tracing, systematic cleaning procedures, sourcing PPE and assisting in managing evacuation centres designed for isolating COVID-19 positive evacuees.

Further emergency programs should focus on strategies to increase participation in public education around evacuation during a pandemic. Holding public education campaigns, exercises, drills and events are all potential ideas with the intention to make emergency preparedness a citizen's personal responsibility. Tabletop or actual exercises that involve setting up the emergency operations centre (EOC) with staff and volunteers following pandemic protocols can eliminate the sharp learning curve. Conducting an evaluation and debrief after the tabletop or

actual exercise can highlight learning opportunities and further reinforce learning for emergency managers and responders.

Conclusion

The CoPG provides ESS to outside communities who need to evacuate to alternate safe communities. Evacuations have a high potential to spread COVID-19 throughout a community. Looking at other evacuation centres and similar designated facilities, several strategies were assessed to see if they increased the margin of safety for evacuees, emergency workers and residents while the CoPG provides ESS services. Despite the research being focused on the COVID-19 pandemic, the implications of this research could further increase evacuation centre resilience for other public health infectious disease outbreaks that may occur while conducting an evacuation.

The CoPG could further improve its ESS delivery model by incorporating mitigation measures at various stages of the evacuation, improving the margin of safety and reducing risk for evacuees, residents and first responders. These mitigation measures include providing transportation advice for personal vehicles and mass transit, clear directions and instruction, increase evacuation centre sites, isolate suspected or confirmed COVID-19 evacuees and use dedicated facilities; promote dispersed evacuation; increase air flow in the evacuation centre site; maximize PPE and manage cleaning equipment usage. Conduct systematic documented cleaning of facilities, pursue education and information campaigns that target both the evacuee and the emergency worker. Future studies should consider how to re-enter a community after having experienced an evacuation during a pandemic.

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