Comparing the impact of COVID-19 on Search and Rescue and fire emergency incident responses

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Abstract

The COVID-19 pandemic resulted in stay-at-home orders in many countries. Europe and North America were most affected for during the first wave in March, April, and May 2020. The mobility of the general population was significantly reduced, with governments directing people to remain indoors unless absolutely necessary. However, the impact on Search and Rescue (SAR) and the other emergency services was unclear, as although the teams themselves were not subject to lockdown, many of the factors leading to their deployment had to change significantly.

Data was collected from SAR organizations that had previously contributed to the International Search & Rescue Incident Database, the United States Coast Guard SAR office, and the London Fire Brigade for the months of March, April, and May for both 2020 and 2019. A significant decrease in incidents was seen in 2020 for the Virginia Department of Emergency Management, The Air Force Rescue Coordination Center, and for the London Fire Brigade. All of the other sources had no statistically significant change while some did show minor increases. It appears, with certain data limitations, that SAR organizations should continue to plan for approximately the same level of response even during a pandemic and should prepare appropriate response guidelines.

Key Words: SAR, Fire and Rescue, COVID-19, Incidents, Seasonality

Introduction

The initial cases of COVID-19 were first reported to the World Health Organization (WHO) on December 31, 2019. (H. Lu, 2020). The causative agent, a virus, was named Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) and the disease was named COVID-19 by the WHO. (WHO, 2020). On March 11, 2020 COVID-19 was declared a global pandemic by the WHO (Cucinotta, 2020). The US Center for Disease Control (CDC)

estimates the virus was being transmitted in communities by late January to early February and entered the United States in January, with early cases going undetected (Jorden, et al., 2020). From January 21st to February 23rd, 2020, fourteen U.S. cases of COVID-19 were detected, with all fourteen related to travel from China (Jernigan & CDC COVID-19 Response Team, 2020) (Schuchat & CDC COVID-19 Response Team, 2020). The first non-travel related case was confirmed in California on February 26, 2020 (Heinzerling, et al., 2020). On March 13th a national emergency was declared in the US (Jorden, et al., 2020). On March 11th both Washington and California limited gathering (IHME, 2020). By March 23, nine states had issued stay-at-home orders and by April 7, 2020 42 states and Washington, D.C. had stay-at-home orders (Mervosh, et al., 2020). The world-wide impact resulted in travel bans, restrictions on public gatherings, and community mobility (Gossling, et al., 2020).

Access to the outdoors was also affected. Most National Parks were closed or had restricted access (Repanshek, 2020). Police were criticised for their actions on policing UK National parks and scenic locations (Gupta, et al., 2020). State Park facilities were closed or restricted around the US and in Canada, a request to avoid outdoor recreation in order to preserve Search and Rescue resources was made by the British Columbia Search and Rescue Association (BCSARA, 2020).

The purpose of this paper is to investigate any detectable impact COVID-19 had on search and rescue and fire response during the months of March, April, and May 2020. Any change would have an impact on both immediate planning and long-term (strategic) planning given the possibility of further waves of the pandemic (Leung, et al., 2020). The current IHME model for the United States currently shows an increase in COVID-19 starting in mid-August (IHME, 2020). This will impact current and future search and rescue (SAR) response.

Stay at home orders did have an impact on overall mobility. Using March 9, 2020 as the baseline for mobility in the US, a drop started occurring on March 11, 2020 and mobility decreased by 50% by March 30. It fell to its lowest point of 53% on April 6, rose to 41% below baseline on May 1, and continues to rise with 31% below baseline on June 1, 2020 (IHME, 2020). The methodology for calculating mobility changes during the pandemic is described by Gao (Gao, et al., 2020). This work led to the creation of a mapping mobility dashboard by integrating large-scale aggregated smartphone data for daily home dwell time and travel distances which can be viewed online (GeoDS Lab, 2020).

Predicting the impact of a pandemic on SAR response is unprecedented, and literature is sparse. Based upon the decrease in mobility data, SAR incidents might be expected to decrease. However, another possible hypothesis is that an increase in people seeking

outdoor recreation (as outdoor activity is encouraged, considered safe and workplaces remain closed) might lead to an increase in incidents. Within the literature, certain previous trends have been documented with regard to seasonality, and historical records may provide some insights.

Weekly trends in SAR incident response have been previously reported. Kelley (1973) was the first to report basic SAR statistics and found 26% of incidents occurred on Saturday and 30% occurred on Sunday. The ISRID database found 18% of incidents occurred on Saturdays and 15% occurred on Sundays. While the Mountain Rescue of England and Wales reported 19.3% on Saturdays and Sundays. In the Maritime environment the Royal National Lifeboat Institution (RNLI) reported 19% of incidents on Saturdays and 20% on Sundays (Greatbatch, et al., 2019). The London Fire Brigade (LFB) showed a slight increase of incidents on Saturdays but Sundays was the same as the rest of the week (Greatbatch, et al., 2019). Monthly trends were also observed with summer months typically the peak. The peak month for the LFB is July, RNLI is August, and ISRID is July (Greatbatch, et al., 2019). Since a monthly trend exists, it is important to compare each COVID-19 month in 2020 to its pre-COVID-19 month in 2019.

Method

Data was sourced from the agencies either by accessing publicly available datasets (LFB), or by contacting the host agency (Poland GOPR, Winnipeg Police, USCG, AFRCC, Washington Emergency Management Division, Oregon Office of Emergency Management, New Mexico State Police, Virginia Department of Emergency Management), who previously had contributed to the International Search & Rescue Incident Database (ISRID). In addition, data was provided by the USCG for SAR response.

Data Descriptions

The London Fire Brigade data represents all fires and special services for March and April for 2019 and 2020 made available by the London Mayor's office and is freely available to download (London Datastore, 2020). The data shows all incidents attended by London Fire Brigade's equipment, including arson, technical rescue incidents, house fires, car and vehicle extractions, and mutual aid services across the border into neighbouring counties during that period. The data includes date and time, spatial location of the response, as well as attribute data concerning the station, equipment used, and nature of the response,

although this research only used the dates from the records. In total, 15,312 date records were used in this work.

The original ISRID database has been previously described (Koester, 2008). Updates to the ISRID database have also been described (Greatbatch, et al., 2019). Past contributors to ISRID were contacted to determine if they could contribute data in a timely fashion. Data was provided from the Polish Górskie Ochotnicze Pogotowie Ratunkowe (GOPR), which is both a professional and volunteer Mountain Rescue organization. The Canadian Winnipeg Police has a speciality search and rescue team. They reported that they are usually not very busy in the late winter and early spring. Both the United States Coast Guard (USCG) and the Air Force Rescue Coordination Center (AFRCC) are federal providers of SAR response. Therefore, they tend to represent a more complete record of incidents that fall within both their Area of Responsibility (AOR) and area of authority. The USCG has responsibility for maritime SAR and also provides SAR for navigable waters in the US. The AFRCC is responsible for missing aircraft, SARSAT beacons, and provides assistance for missing persons often in the form of cellular forensics. Data from Washington, Oregon, New Mexico, and Virginia all represent state agencies responsible for maintaining records on SAR response in the state. In some of the states, local governments are responsible for SAR and may or may not report the incident to the state.

Data from the USCG SAR office was provided via a spreadsheet. The spreadsheet provided totals for each month, starting and October 2017 and running through June 2020. The data was broken into 45 different categories and then totalled for each month. Only the totals from March – May for 2019 and 2020 were used in the analysis. While the spreadsheet covered a total of 38,706 incidents only 6438 incidents meet the criteria for data inclusion (date ranges).

Contributors were asked for the total number of incident responses during the time of the COVID-19 Pandemic (March-May 2020) and for the corresponding data from the previous year (March – May 2019). Contributors were also asked for any observations regarding their data. Data was provided in either an Excel spreadsheet or via email. Data consisted of the month and year, and the total number of incidents. In some cases the type of incident was provided as well. Data was then combined and placed into a single Excel spreadsheet.

Results

The data was placed into Microsoft Excel for data-organisation and descriptive statistics (Microsoft Corporation, 2018). There was some variation in the datasets, and the various descriptive statistics for each dataset are presented in Table 1. The relevant study period for COVID-19 was March – May 2019 and 2020. While several states and countries have not relaxed stay at home orders or other restrictions, this study was conducted in early June and required a consistent cut-off point. March was chosen as the start point of the study since COVID-19 was declared a Pandemic on March 11th and various states and countries started issuing orders in response. The numbers of cases were collected for March, April, and May of 2020 and data was compared to 2019 in order to make a more direct comparison.

	GOPR (Poland)	Winnipeg SAR	USCG	AFRCC	WA	OR	NM	VA	LFB
n_{2019}	37	2	3161	2557	228	233	39	37	8164
n_{2020}	35	2	3277	2113	211	210	45	15	7148
Change	-5.4%	0.0%	3.7%	-17.4%	-7.5%	-9.9%	15.4%	-59.5%	-12.4%
Mar	-36.4%	0.0%	0.5%	-25.9%	-30.4%	6.8%	20.0%	-72.7%	-7.1%
Apr	-10.0%	0.0%	-7.0%	-17.0%	-14.3%	-36.0%	40.0%	-45.5%	-17.6%
May	18.8%	0.0%	12.7%	-13.2%	18.6%	11.2%	-7.1%	-60.0%	
P	0.814	1.000	0.148	<0.001	0.417	0.269	0.510	0.002	<0.001

Table 1: Shows each data source, the total number of cases for March - May for both 2019 and 2020, the change in percentage between the two years, the change for each month from 2019 to 2020, the P value for the overall change from 2019 to 2020 using Chi-square analysis. See glossary for abbreviations.

It can be seen from Table 1 that the absolute number of incidents increased for the USCG (3.7%) and New Mexico (15.4%) during the period of March – May 2020 compared to incidents in 2019. No change was seen in Winnipeg SAR response (although the sample size was small). A decrease in incidents was seen for the AFRCC (17.4%), Washington (7.5%), Oregon (9.9%), and Virginia (59.5%). The month with the greatest decrease was April. The London Fire Brigade responses decreased by 12.4% during March and April, 2020 with the largest decrease (17.6%) reported in April. At the time of this study, data wasn't available for May. Washington and Oregon reported a large increase in incidents during the

Memorial Day weekend holiday in late May), with Washington showing a decrease in March and April and an increase in May.

Discussion

A significant decrease in incidents only occurred for AFRCC, Virginia Department of Emergency Management, and the London Fire Brigade. This would be an expected result when considering stay at home orders and decreased mobility. While Washington, Oregon, and GOPR experienced an overall decrease, the increase in incidents in May made the overall decrease statistically insignificant. The increase in May was attributed to increased Memorial Day incidents and increased mobility at the end of the month by the State SAR Coordinators (REF or evidence). The USCG and New Mexico experienced an overall increase in incidents, although it didn't achieve statistical significance.

In both 2019 and 2020 a total of 13 weekends occurred. The data was also matched month for month. Therefore, any differences seen were not due to weekends or seasonal trends that have previously been observed. What the data cannot account for is any long-term trends of increasing or decreasing incidents like differences in weather, population, in outdoor recreational participation, at-risk population fluctuations, or in the utilization of state resources. In spite of these unknowns, the COVID-19 stay at home orders remain the best explanation for any changes where they did occur.

Depending upon the location and type of SAR activity, incidents either decreased or stayed the same. This has important planning impacts on SAR organizations. Just because the population is told to stay at home doesn't mean it will. The need for a well-organized SAR response remains. Even in areas that had a statistically significant decrease in incidents, the need to respond still remained.

Limitations

The data was rapidly collected and many previous contributors of data to ISRID and previous studies did not have data available or working remotely made it difficult to provide the requested data. The study period was two simple snapshots in time; three months in 2019 and three months during the COVID-19 Pandemic during 2020. Upward or downward trends could have already been in place as mentioned above and have nothing to do with the COVID-19 changes. Significant decreases could have been erased by a pent-up public heading for the outdoors in late May.

Conclusion

While some statistically significant decreases in SAR incidents did occur for some of the data contributors, most saw either no statistical change or a non-statistical increase. For SAR organizations, the message is clear; it is important to be prepared to respond to SAR incidents even when the public is told to stay at home. This requires significant planning on managing team members who may be infected, at risk team members, representatives from other agencies, and the public. Issues such as transport to scenes of operations, the staffing of command posts and working in the field whilst observing social distancing and decontamination need to be considered. Finally, consideration will also need to be given in cross-border incidents where different legislations and organisations have differing or even contradictory requirements for maintaining biosecurity.

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About the Authors

Robert J. Koester first joined the Appalachian Search & Rescue Conference in 1981 and since then has participated in hundreds of searches, including over a hundred as Incident Commander. He holds a Ph.D. from the University of Portsmouth in search theory and a MS and BA from the University of Virginia in biology (neurobiology). His contributions to search and rescue include seminal research on search theory and lost person behavior along with creating the International Search and Rescue Incident Database (ISRID). He is an instructor for the Virginia Department of Emergency Management since 1988 and past president (15 years) of the Virginia Search and Rescue Council. He is currently developing SAR software called FIND, for the US DHS S&T Directorate. He also developed courses for DCJS and was

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Abbreviations

AFRCC	Air Force Rescue Coordination Center (US)
AOR	Area of Responsibility
CDC	Center for Disease Control (US)
GOPR	Górskie Ochotnicze Pogotowie Ratunkowe
ISRID	International Search & Rescue Incident Database
LFB	London Fire Brigade
n	Count
NM	New Mexico State Police
OR	Oregon Office of Emergency Management
P	Probability value
RNLI	Royal National Lifeboat Institution
SAR	Search and Rescue
SARS	Severe Acute Respiratory Syndrome
SARSAT	Search and Rescue Satellite Aided Tracking
USCG	United States Coast Guard
VA	Virginia Department of Emergency Management
WA	Washington Emergency Management Division
WHO	World Health Organization

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