

models, we are better able to conceptualize performance under pressure and to propose pathways for evaluating and optimizing performance in dynamic and complex scenarios.

Prehosp Disaster Med 2017;32(Suppl. 1):s109–s110
doi:10.1017/S1049023X17003156

Arctic Disaster Risk Reduction and Response: Community-Based Approaches in the Face of Wicked Problems and Cascading Disasters

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Study/Objective: To examine community-based Disaster Risk Reduction and Response (DRRR) approaches to wicked problems (Rittel and Webber 1973) and cascading disasters (Little 2012; Pescaroli 2015) in the Arctic; and to understand how these approaches do or do not change in correlation with the degree/type of the wicked problem and related circumstances, such as the degree of interconnectedness of critical infrastructure.

Background: Communities across the Arctic have been subjects to climate stressors, impacts and other natural-hazard induced or man-made crises and disasters. These range from violent ocean and winter storms, landslides, floods, erosion, earthquakes, tsunamis, nuclear, maritime and aviation incidents, etc. In some cases, the response is governmentally aided, such as in the case of planned relocations of entire communities to other, safer locations (see Alaska or Norway). However, when facing disasters of a more complex nature - ie. cascading disasters, wicked problems, interconnected infrastructures across functional and national boundaries - emergency and disaster response institutions have often been slow to adapt and react. Consequently, many communities across the Arctic feel left to their own devices in dealing with DRRR.

Methods: Following an extensive literature review of the theoretical framework, this qualitative study examines and analyses case study data from around the Arctic, to shed light on community-based approaches to vulnerability and risk reduction and response to cascading disasters and wicked problems.

Results: Initial results indicate valuable insights into a novel topic, and shows the challenges and barriers faced by communities when responding to these complex events. We recognize adoption of innovative, self-help approaches such as the use of Para diplomacy and knowledge transfer with other communities around the Arctic who face similar challenges.

Conclusion: Final conclusions including, diplomatic implications, future research directions and where possible, policy recommendations, will be presented at the WADEM Toronto conference in April 2017.

Prehosp Disaster Med 2017;32(Suppl. 1):s110
doi:10.1017/S1049023X17003168

Doctor-Heli Fleet Operations During the 2016 Kumamoto Earthquake in Japan

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Study/Objective: This study described and analyzed the operations of the Doctor-Heli (DH) fleet, comprising of 14 DHs and a headquarters in Kumamoto prefecture.

Background: The “physician-on-board” helicopter system, called Doctor-Heli (DH) in Japan, is crucial in the event of a widespread disaster. During the 2011 Great East Japan Earthquake, the DH fleet carried out effective operations during a real disaster for the first time in Japan. After the earthquake, a new command and control system of the DH fleet, and headquarters at the prefectural government level, were instituted. In April 2016, the Kumamoto region of Kyushu Island, southern Japan, was hit by a major earthquake.

Methods: An air medical transport record of Kumamoto earthquake has been analyzed.

Results: In total, the 14 DHs transported 75 patients in the first five days (April 16–20, 2016). Most of the patients were transported to neighboring prefectures that were not damaged by the earthquake. The headquarters of the DH fleet in Kumamoto Prefecture, requested assistance from other organizations to use their helicopters for medical transportation. Thereafter, five helicopters from the Japan Self-Defense Forces, eight from Fire departments, and one from the Coast Guard were used for medical transportation. Of the 89 transported patients in total, 30 (34%) sustained traumatic injuries due to the earthquake, and three (3%) suffered pulmonary embolism while asleep in vehicles at the disaster site. Furthermore, dynamic satellite monitoring, which was developed after the 2011 Great East Japan Earthquake, was used for all DHs, as well as helicopters from the fire departments, and was effective for information sharing, efficient operations, and safety.

Conclusion: The command and control of the DH fleet, the headquarters at the prefectural government level, and dynamic monitoring developed after the 2011 Great East Japan Earthquake were usefully employed. More efficient coordination of the DH fleet, and cooperation with other organizations, are ongoing challenges.

Prehosp Disaster Med 2017;32(Suppl. 1):s110
doi:10.1017/S1049023X1700317X

The Experience of the Ecuadorian Red Cross in the Joint Deployment of an Emergency Medical Unit Post, April 2016 Earthquake

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Study/Objective: To study the lessons learned from the joint deployment.

Background: On April 16th 2016, at 6:58 pm. an earthquake of 7.8 Richter scale, hit west of Ecuador. As a result 673 people died, 4,859 injured, 8,000 displaced, 51 health care facilities damaged, and 593,000 persons had reduced access to health care services. The Canadian Red Cross together with the Ecuadorian Red Cross deployed (on April 20th) Emergency Medical units to support the affected population. The units were deployed in Jama and El Matal, and later moved to Pedernales, where they stayed until September 30th when the services were taken over by the Ministry of Health (MoH).

Methods: Data was collected from the unit's statistics, as well as from the operation's debriefing.

Results: A total of 46,356 patients have been treated in the fixed facilities and the mobile clinic. There were 31,821 (68.6%) patients for internal medicine, 3,039 patients with GOB (mass or lump) needs (6.5 %), and Odontology needs became an issue with 3,137 (6.7 %).

Conclusion: Successful joint deployment of an International and National team. Hand-over of the EMU from the Canadian RC to the Ecuadorian RC serves as crucial local capacity building for the ERC for future disasters. The Ecuadorian Red Cross High Technological Institute, the biggest training school for paramedics in the country, served as a major resource in the response (initial and long term) allowing the deployment of more than 2,000 persons to the affected areas. This earthquake has been the only large scale disaster the country has faced in 10 years. The response capacities have been increased significantly post disaster.

Prehosp Disaster Med 2017;32(Suppl. 1):s110-s111

doi:10.1017/S1049023X17003181

2013 Colorado Floods, Boulder's Emergency Animal Air Rescues; A Military and Animal Control Collaboration

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Study/Objective: I. Introduction of the 2013 Colorado Floods II. Preparedness for potential county-wide emergency events III. The response; Emergency Operations Center (EOC), ground rescue, and animal sheltering IV. Helicopter Evacuations; collaboration between military and animal control V. Lessons Learned and concluding remarks reinforcing the necessity and value of collaboration

Background: In September 2013 the State of Colorado suffered a major flood event affecting 17 counties. Boulder County was the most devastated county in terms of lives lost, homes destroyed, and families displaced. The Colorado National Guard and the Army were requested for assistance with human evacuations from the ground as well as the air. When the Military responded to evacuate flood victims and were faced the challenge of air-evacuating pets, their compassion for the evacuees led them to the decision to air evacuate pets as well, setting the precedent for this emergency. The Boulder Police Animal Control Unit responded to manage and supervise the staging area for incoming rescued evacuees and their animals.

Officers had key roles during this event; training military personnel on animal handling and equipment, handling a variety of animals to ensure the safety of emergency responders, evacuees, and animals; evaluation for veterinary treatment; and provided care for the animals. The use of resources, improvisation, and collaboration during this event led to the successful evacuation of over 1,500 evacuees and their pets.

Methods: Provided in Background.

Results: The 2013 Colorado Floods led to the second largest helicopter rescue for humans to date, and the largest helicopter evacuation of animals. This disaster tested both the ability and capability of aerial evacuations for varied species of animals. In the midst of disaster, the US military and animal control collaborated to successfully evacuate over 1,500 people and their pets (estimated 800-1200 animals).

Conclusion: To provide audience with capabilities, suggestions, and practical application for aerial evacuations of animals during disasters.

Prehosp Disaster Med 2017;32(Suppl. 1):s111

doi:10.1017/S1049023X17003193

Monitoring the Well-being of AusMAT Members

Deployed to Fiji following Tropical Cyclone (TC) Winston

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Study/Objective: To monitor the well-being of Australian Medical Assistance Team (AusMAT) members deployed to Fiji following Tropical Cyclone (TC) Winston.

Background: The AusMAT response to TC Winston resulted in small teams across a variety of locations. Due to the limited day to day visibility and communication with individual team members, oversight of team welfare was likely to be challenging.

Methods: An anonymous electronic survey, the AusMAT well-being questionnaire¹, was completed by team members following each work shift during deployment. The questionnaire assessed perceptions of physical workload, weather conditions, body temperature, symptoms of heat stress, access to food and fluids, fatigue and sleep factors. Responses were compiled by the National Critical Care and Trauma Response Center, ensuring anonymity of responses. A brief report consisting of two paragraphs, overall trends and recommended actions, was compiled for the mission lead on a daily basis.

Results: An example of the overall trends summary from day 3 is provided.

- ~35% of the team reported hot working conditions.
- ~50% of the team reported feeling moderately to severely hot during shift.
- ~15% of the team reported severe to extreme fatigue post shift.
- ~30% of the team aren't able to get out of the warm/hot conditions during their down time.
- ~40% of the team reported warm sleeping conditions but overall sleep data is acceptable.