

Characterizing Nuclear Fallout Patterns in Atlanta, Georgia

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Introduction: Weather significantly affects the distribution of fallout radiation resulting from a nuclear detonation. Prior nuclear detonation models have either utilized a “typical” day for the city of interest or have chosen conditions that optimize fallout radiation. However, models that aid emergency planners should utilize representative weather conditions to capture the most likely distribution of fallout radiation for the region of interest.

Method: Fallout radiation resulting from an improvised nuclear device detonation in Atlanta, Georgia, USA was simulated for each day in 2019 using the Hazard Prediction and Assessment Capability (HPAC) software and weather from Modern-Era Retrospective analysis for Research and Applications, Version 2 (MERRA-2). A partition around medoids cluster analysis was conducted, based on the characteristics of the plumes, population at risk, and estimated proportion of fatalities. A multinomial logistic regression, a decision tree, and a random forest model were then used to predict the cluster from surface-level weather data.

Results: On average, the fallout plume was 160.25km long, had an area of 3,174.44 km², and was angled 83.5° from due north. The plume on average contained 3,668,173 individuals at risk for exposure and caused 416,8908 casualties. Four clusters were identified to represent the distribution of fallout radiation. The random forest model was best able to predict the cluster using surface-level weather data, with an average accuracy of 57.24% (kappa = 0.385). The variable importance plot suggests north-westerly winds, cloud coverage at detonation, whether it is summer, and average temperature are among the most important variables for classification.

Conclusion: Meaningful representation of the variation in the distribution of fallout radiation is imperative while creating nuclear detonation models. While an analysis of the fallout distribution throughout a calendar year provides important insight, future research may examine longer study periods to better understand the climatological impacts on fallout radiation.

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Wellbeing of Helicopter Emergency Medical Services (HEMS) Personnel in a Challenging Work Context: A Qualitative Study

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Introduction: Helicopter emergency medical services (HEMS) personnel provide on-scene trauma care to patients with high mortality risk. The HEMS work context is characterized by an exceptionally high exposure to critical incidents, emotionally demanding patient encounters, and having to perform under pressure with limited resources. The aim of this study was to further our understanding of the factors underlying HEMS personnel wellbeing given their challenging work context.

Method: Sixteen semi-structured interviews were conducted with HEMS personnel from a University Hospital in The Netherlands. Interview topics included work context, personal characteristics, coping, work engagement, and psychosocial support. To analyze the data, a generic qualitative research approach was used inspired by grounded theory, including open, axial and selective coding.

Results: The analysis revealed ten categories that provide insight into factors underlying the wellbeing of HEMS personnel and their work context: team and collaboration, coping, procedures, informal peer support, organizational support and follow-up care, drives and motivations, attitudes, other stressors, potentially traumatic events, and emotional impact. The findings show that HEMS personnel are highly motivated and have a strong team mentality. Various factors are important to their wellbeing, such as job resources and social support. The HEMS work can have an emotional impact but HEMS personnel use various coping strategies to deal with this. The perceived need for organizational support and follow-up care is low among participants.

Conclusion: This study identifies factors and strategies that support the wellbeing of HEMS personnel. It also provides insight into the HEMS work culture and help-seeking behavior in this population. The findings may be beneficial to understand and support employee wellbeing in other emergency services work contexts as well.

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Stress and Coping Strategies Among Those Affected by Ebola Virus Disease (EVD) Epidemic in Sierra Leone, West Africa

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Introduction: The 2014–2016 Ebola Virus Disease (EVD) outbreak in West Africa resulted in 28,000 infected and over 10,000 deaths. Sierra Leone was one of the hardest hit countries. The purpose of this study is to examine the coping strategies employed by those most affected by EVD and its related stressors in Sierra Leone.

Method: 228 EVD-infected individuals, EVD-affected individuals, and community leaders were recruited using purposive

maximum variation sampling. Key-informant interviews (n=42) and focus group discussions (n=27) were conducted across five districts in Sierra Leone. Data were analyzed and coded inductively by a team of researchers, using Thematic Content Analysis using NVivo (k=0.80 or above for interrater reliability).

Results: Participants described stressors, coping and support on four levels: individual, family, community, and society. On the individual level, theft and spoiled belongings were leading sources of stress while faith and spirituality were main sources of coping and support. On the familial level, lack of financial resources and inability to work emerged as primary stressors, while engaging with family was a main source of support. On the community level, social exclusion emerged as a prominent stressor and community reintegration as a source of support. On the societal level, participants' lack of governmental support and termination of support from NGOs emerged as stressors, and provision of formal material assistance as a source of support.

Conclusion: In a widespread public health crisis, understanding people's perceptions of the most salient stressors and sources of support can inform future responses. In this study, participants experienced stressors and support across multiple levels of the social ecology, such as grief and faith, household financial pressure and kinship care, and formal material resources for survivors. Results also showed the importance of community-led initiatives that addressed material needs, as well as social acceptance and social support.

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Prehospital Nursing Volunteer's Personality Traits: A Motivational Perspective

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Introduction: The aim of this cross-sectional, descriptive study was to determine the personality traits and motivation of nursing volunteers and their effects on pre-hospitalization emergency care.

Method: Participants were 133 pre-hospital nursing volunteers from Taiwan. This study was performed using self-administered basic demographic information, Eysenck Personality Questionnaire-Revised Short (EPQ-RS), and Volunteer Motivation Scale with Chinese Volunteers (VMS-C). The statistical analysis was performed by SPSS 23.0. The data collections were analyzed by nonparametric statistics, correlation coefficient, covariance analysis, and one-way ANOVA analysis multiple regression analysis.

Results: Our findings showed that having social desirability and extraversion personality had a positive impact on the attitudes of volunteers in terms of the provision of pre-hospital care. The first identified regulation was highlighted in the motivation scale; intrinsic motivation was secondarily emphasized. Pearson correlation coefficient revealed years of service in volunteering

seniority, age, gender and nursing seniority were correlated. On the contrary, the job department and six municipalities were negatively correlated. Equivalence with the other relation, participants' attending hours per month in volunteering and gender were positively related. Inverse correlations were found in age and nursing seniority. Extraversion personality and involvement in specific municipalities were positively correlated.

Conclusion: Emergency Medical Services (EMS) has been developed in Taiwan for more than 20 years and must improve the quality of EMS. These results may be used to improve the quality of the pre-hospital care system and encourage nursing staff to join the system. Nursing volunteers in pre-hospital care are a particularly valuable resource, and satisfy a pivotal role early in the process of pre-hospital care. It is recommended that we provide a good interpersonal environment to maintain the good will of the dedicated, experienced, enthusiastic volunteers in Taiwan.

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Japan DAMT COVID-19 response. The Temporary Medical Facility for Hospitalization Waiting and Doctor Home Response System in Sapporo City, Hokkaido

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Introduction: In Japan, the response to COVID-19 has been a disaster response. In May 2021, the number of patients requiring hospitalization increased rapidly in Sapporo City, Hokkaido. Almost all medical institutions and clinics were overcrowded, and patients were forced to wait at home. Sapporo City requested a response from the Japan Disaster Medical Assistance Team (DMAT).

Method: DMAT collaborated with the Sapporo City Public Health Center to set up a patient waiting station (The Temporary Medical Facility for Hospitalization Waiting) utilizing an unused hotel. DMAT placed the patient under medical care, provided oxygen therapy and other procedures, and coordinated hospitalization referrals. DMAT also organized a doctor home response system for patients who need emergency hospitalization and those who have returned home from The Hospital Waiting Stations.

Results: 64% of the patients were admitted to hospitals, 27% back to their homes, 9% were sent to residential care facilities, and 1% were sent to welfare facilities. The doctor home response system was able to redirect 52% of patients requiring emergency hospitalization.

Conclusion: For the rapidly increasing number of patients with COVID-19, DMAT established a temporary medical facility and home visit system and was able to minimize the number of preventable deaths.

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