

**Introduction:** Emergency service workers perform physical work while being subjected to multiple stressors and adverse, volatile working environments for extended periods. Recent research has highlighted sleep as a significant and potentially modifiable factor impacting operational performance.

**Aim:** This presentation would (a) examine the existing literature on emergency service workers' sleep quantity and quality during operations, (b) synthesize the operational and environmental factors that impact sleep (e.g., shift start times, shift length, sleeping location, smoke, noise, heat), and (c) assess how sleep impacts aspects of emergency service workers' health and safety, including mental and physical health and performance.

**Methods:** This presentation would be based on a narrative review conducted by the authors which used a systematic search strategy of health-related databases. Articles that were not relevant, duplicate or from non-peer-reviewed sources were excluded.

**Results:** Sleep is restricted during emergency service deployments, particularly when shifts have early start times, are long duration, and/or when sleeping in temporary accommodation (e.g., tents, vehicles). Shortened sleep impairs cognitive but not physical performance under simulated emergency services conditions.

**Discussion:** Depending on the organization and jurisdiction, these findings warrant re-evaluation of existing policies, formalization of beneficial but currently ad-hoc practice, or provide support for current procedures. Work shifts should be structured, wherever possible, to provide regular and sufficient recovery opportunities (rest during and sleep between shifts), especially in dangerous working environments where fatigue-related errors have more severe consequences. For agencies to continue to defend local communities against natural hazards, strategies should be implemented to improve and manage emergency service workers sleep and reduce any adverse impacts on work.

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### Social Media in Disasters

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**Introduction:** Individuals may not receive messages via usual sources. Social media such as Facebook, LinkedIn, Twitter and social networking groups have been useful in the notification, information dissemination, safe notices, and reunification.

**Methods:** A survey of the literature and of social media sites to determine what possibilities of notification, information exchange, marked safe, and reunification information that can be helpful in disasters.

**Results:** Social media is useful during all phases of a disaster: pre-disaster notification, information dissemination during disasters, and safe notices/reunification post-disaster

**Discussion:** Social media is internet-based and requires a device that needs power. There is widespread internet access to various forms of social media, such as email, various broadcast sources,

and social networking sites. Social media may provide pre-disaster warnings (weather alert app, reverse 911), evacuation/sheltering information, blocked routes, open gas stations, stores with supplies, hotels/motels with rooms, and shelter locations. Social networking groups were full of messages informing others they could shelter someone fleeing the California wildfires and recent hurricanes. Volunteers can be alerted and responses collected via social media groups. Social media may reach individuals earlier than official announcements, although sometimes accuracy may be in question. Rumor and malignant information source as well as inaccurate information are possible and may need to be managed. Separation is common during disasters. Knowing if their loved ones are safe and well, then reunifying is critical, especially for the vulnerable: children/infants, elderly, and disabled. Reunification systems need safeguards for vulnerable individuals who may be exploited or abused during disasters. In previous disasters (Hurricanes Maria, Mark, and others; California wildfires), when usual communication was nonfunctional due to downed power lines or damaged/destroyed substations; social media was deluged with individuals giving names and identifying information for family and others and asking whether anyone has seen or heard from them.

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### Standardized Measurement of Capillary Refill Time using Novel Technology

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**Introduction:** In a patient going into shock, blood is redistributed from the periphery to the central circulation, making an assessment of skin perfusion useful in a prehospital setting. Capillary refill time (CRT) is the time required for a pressure blanched skin site to reperfuse. Currently, CRT is tested by manually applying pressure for 5s to the skin and observing the time before reperfusion. Guidelines state that CRT should be 2–3s in a healthy patient. Shortcomings in this procedure include lack of standardization of pressure, subjective assessment of the time for reperfusion, and not accounting for the patient's skin temperature.

**Aim:** To develop a standardized objective procedure for testing CRT in the prehospital setting.

**Method:** The study protocol was approved by the Ethics Committee at Linköping University (M200-07, 2015-99-31). An electro-pneumatic device exerting constant force (9N) over 5s was developed. CRT was measured using the Tissue Viability Imager (Wheelsbridge AB, Sweden) which relies on polarization spectroscopy. To simulate hypothermic conditions, healthy volunteers were subjected to low ambient temperature (8°C). Blood loss was simulated using a custom-built lower body negative pressure (LBNP) chamber. In both scenarios, the CRT test was carried out on three test sites (finger pulp, forehead, and sternum).

**Results:** CRT on the finger pulp and sternum was shown to be increased following the hypothermic conditions, but not on the forehead. Skin temperature on the three sites followed the same pattern, with the forehead being virtually unchanged. Tests performed during LBNP revealed an apparent effect on CRT following the simulated blood loss, with prolonged CRT for all sites tested.

**Discussion:** A successful methodology for objective assessment of CRT was developed, which was validated on healthy volunteers following hypothermia or simulated blood loss. Ongoing work will investigate a combination of hypothermia and blood loss to more accurately simulate the prehospital setting.

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### Strategies to Decrease Nurses' Stress in a Federal Medical Station (FMS) Medical Needs Shelter in the U.S. after a Hurricane Disaster

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**Introduction:** National Disaster Medical System (NDMS) Disaster Medical Assistance Teams (DMATs) are used to provide medical care when local and state resources are overwhelmed in response to natural and human-made disasters. The stress these professionals experience during these events requires intentional and therapeutic interventions to support emotional and mental resilience. Evidence-based interventions will be presented.

**Aim:** DMATs were deployed after Hurricane Maria to work in a Federal Medical Station (FMS), at the Coliseum Bencito, Manati, Puerto Rico. The FMS was operated through a collaboration of federal agencies and non-government agencies. Community infrastructure was impacted, including two damaged area hospitals, overwhelming available resources with increased patient care demands. The facility provided acute care and short-term services around the clock for a 10-day period, serving several hundred clients, in and around the municipality of Manati.

**Methods:** Several strategies were utilized to decrease stress levels while nurses worked at the FMS included having a safe and secure environment, sharing stories with peers, taking scheduled breaks, utilizing physical activities (Zumba), and having designated sleeping areas. Additional strategies used for clients were relief supply choices, allowing one person to stay with special needs client, and bereaved care.

**Results:** Nurses were able to decrease stress levels to themselves and clients while working with community partners providing acute and chronic health care needs at the area where health care services were impacted. Verbal and written feedback was provided during formal and informal meetings as well as receiving client comments on the services given at the facility.

**Discussion:** Contribution to practice-heightened emotional responses in a disaster setting are expected and should be a focus of intervention even with health care providers. Nurses were able to employ disaster nursing knowledge, including mental

health strategies in this setting and be able to better address the needs of others.

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### Study of Guardians' Recognition of Children's Safety After a Disaster

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**Introduction:** In Japan, after an earthquake, or when there is a heavy downpour, transportation is affected and guardians of children may not be able to reach home in time from the office. In elementary schools, because the guardian is unable to come and pick up the child, the teacher needs to ensure that the children are protected, and therefore, bears enormous responsibility. Since commuting times to work are long, guardians need to instate measures for the safety of their children.

**Aim:** This study aims to clarify guardians' recognition of children's safety in the event of a disaster, and examine the corresponding challenge they face in terms of commuting distance.

**Methods:** The subjects are 2,181 guardians of children in four elementary schools near places where landslides had occurred in Hiroshima city in 2014. The questionnaires distributed throughout the school produced 1,027 valid responses. Guardians were divided based on commuting distance into two groups; one of whom were within 3-km commuting distance and the other of more than 3 km. The two groups were compared for their recognition of children's safety using a chi-square test.

**Results:** Children's safety in school was a concern for 73.9% of guardians. The safety of school buildings in case of a disaster was a cause of concern for 80% of guardians who are close commuters, and 73.9% of guardians whose commute distance is longer ( $P = 0.015$ ). The fact that children cannot return home was a cause of worry for 33.9% of guardians whose workplace is nearby, and for 29.9% whose workplace was distant ( $P = 0.044$ ).

**Discussion:** Most parents, especially guardians going to work far away, do not recognize that they cannot reach home, and therefore, need to think about providing safety measures for their children in the disaster.

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### Study on the Effectiveness Evaluation of Personal Protective Equipment for Health Care Staff Trained with Graphical Interpretation and Operation

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**Introduction:** Proper use of personal protective equipment (PPE) is essential when facing emerging infectious diseases.