Results of a Two-Year Sleep Health Study With National Guard Disaster Responder Medical Personnel

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Purpose/Aims: The overall mission of the U.S. Air and Army National Guard (NG) is to respond to chemical, biological, nuclear, radiologic and natural disaster and emergency events. NG Medical Personnel work and live in nonmilitary settings with obligations of 2 days a month and 2-4 weeks a year for disaster training. High-intensity simulated disaster training exercises are used to prepare guardsman for mission capability. Research demonstrating the prevalence and extent of sleep deprivation along with its impact on military personnel’s performance during simulated disaster training exercises is needed. This study focused on determining the extent of sleep deprivation as well as the impact of sleep disruption on operational performance in NG Medical Personnel responding to simulated disaster training exercises.

Rationale: It is critically important to understand the prevalence of sleep deprivation in military personnel so that targeted interventions can be developed that protect both our servicemen and safeguard their ability to protect civilians. This understanding is not just important for individual service members, but for the cohesive functioning of a military unit. High-intensity simulated disaster training exercises provide the ideal opportunity to study this population in an accessible field environment, as they are a well-accepted proxy for real-world disasters.

Method: This is a prospective, repeated measures study of 77 NG Medical Personnel from two Air Force Bases called up for disaster training exercises. Data about sleep health (civilian and during training exercises) measured using actigraphy, sleep history (questionnaires and self-reported sleepiness) and medical decision making (critical skills) were collected from five training exercises. Generalized linear mixed models were used to examine the relationship between sleep health, history, and changes in critical skills performance within and across the days of the training exercises.

Results: On average, participants received 7.16 hours of sleep per 24h period during the baseline measurement period. Their average sleep quality was 85% and their cognitive effectiveness score was 91%. These baseline scores suggest our participants were generally healthy sleepers. During the transition and disaster exercise period, participants' sleep quantity dropped significantly to 5.9 hours (F=39.22 (1,74); p=<0.0001), and their cognitive effectiveness also dropped significantly to 87% (F=19.61 (1,58); p<0.0001). Sleep quality did not vary significantly across measurement periods. Findings on the impact on cognitive performance suggest slower response times in the evening compared to the morning and across days of training exercises (F-statistic (df1, df2)=10.35(1,168); p-value=0.0016). Response times (in seconds) on Day 1 of a four-day exercise in the morning (8:00 a.m.) compared to evening (8:00 pm), respectively, were [mean (standard deviation)]: 34 (29) versus 51 (59). Corresponding response times on Day 3 were: 35 (26) versus 65 (60). Accuracy declined for questions sent later in the day compared to questions sent earlier in the morning, although the decline was not consistent across the days of the training exercise (F-statistic (df1, df2)=0.45 (1,169); p-value=0.5010). Actigraphy measures of sleep and self-reported sleepiness at the time of completion of each question were not statistically associated with slower responses or accuracy. However, at least one-third of the participants reported being very sleepy on the morning of Day 1. By the end of each day, nearly two-thirds of the participants reported being very sleepy.

Implications: Our results reveal that National Guard Medical Personnel were sleep deprived during a simulated disaster training exercise. Although these types of exercises are a valid proxy for real world disasters they are likely to be a conservative approximation of the stress guardsmen experience during crisis response. Sleep deprivation increases the risk of errors, incidents and accidents which have
associated costs and health/safety implications. As such, the need for targeted fatigue-related interventions to safeguard our servicemen during these critical times is clear. There is ample data from multiple sources to support the need to improve sleep and increase sleep opportunity during these extended operations. Recommendations for medical and nursing commanders that address sleep health for service members under their command are needed. These recommendations have the potential to assist in improving mission capability by reducing fatigue-induced errors by National Guard service members.

Title:
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**Abstract Summary:**

The overall mission of the States’ Air and Army National Guard are to respond to chemical, biological, nuclear, radiologic and natural disaster and emergency events covering areas similar to FEMA regions. This presentation focuses on the overall logistics, challenges and unique features when considering research with National Guard units.

**Content Outline:**

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b. Self-reported sleep health data

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Implications

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b. Implications to patient safety

c. Implications to military mission
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