Emergency Medical Services Occupation-Related Sleep Habits

Michael Ashkinadze, B.S.; Abigail Bigham, PhD

Abstract

Background. Emergency medical services personnel continue to work difficult hours that result in increased demands from the body. **Objective.** This cohort study aims to investigate the effects of sleep patterns during working hours and how they affect individuals in and outside of work. **Methods.** Individual responders from different 9-1-1 agencies were recruited to fill out a simple questionnaire after the end of each shift that asked them questions about their sleep patterns as well as personal behavior and state. **Results.** Total results showed that, on average, emergency medical service workers receive less sleep than the recommendation for adults in the United States. The tests also demonstrated that individuals working in higher socioeconomic areas received more sleep and had less negative effects on their personal state than their counterparts working in lower income areas. **Conclusions.** The obtained results indicate that personnel in emergency medical services are not receiving adequate sleep on the job, and this has led to behaviors associated with dangers for both patients and responders alike.

Introduction

Emergency medical services (EMS) are a public necessity for health care emergencies and must be able to operate 24 hours a day, seven days a week, year-round. Providers, which include emergency medical technicians (EMTs) and paramedics, must be ready for a variety of calls, have proper equipment, and have well-trained coworkers. In a field where small details may lead to differences in treatment, EMS workers are expected to assess, analyze, and treat patients in what are often considered sub-optimal conditions where clinical settings can range from highways to industrial zones. EMS service therefore comes with specific issues and demands with regards to workforce scheduling, maintaining proper staffing levels to ensure rapid responses, and minimizing fatigue for workers. However, EMS agencies implement a standard 24-hour shift schedule. This schedule has added to the difficulties faced in EMS by changing sleep and meal habits for employees who must restructure their work environment into a temporary home. Further exacerbating the effects of a 24-hour shift, many EMS workers work for consecutive days with little rest. In contrast, many adjacent fields such as nursing, police, energy, and security have adopted 12-hour schedules as the standard work shift.

We investigate sleep duration during EMS shifts to understand the symptoms and habits associated with EMS work-related sleep schedules. In addition, we further look into how these different habits are impacted by various areas of service to understand the impact of SES on the personnel that help provide care to these communities. Documenting the effects that these differences have on EMS personnel by changing their sleep schedule is an important aspect of understanding of public health systems. By also incorporating the communities served into this study, we investigate any differences that may be occurring in EMS clinicians based on their area of service. In many previous studies, EMS sleep has been looked as a whole, but within this study we aim to acknowledge the differences that may be occurring based on SES. It is important to recognize this difference because the standards of care and call volume vary significantly based on SES. This then, impacts providers and when it is further investigated, we are able to see any potential gaps in the current EMS model that are being further exacerbated by differences in SES status.

Table 1. Average Amount of Sleep Reported In Different Areas (hours)

	All Areas	High SES	Middle SES	Low SES
Mean	3.1	4.9	3.8	1.9
Median	3	5	4	2
Standard Deviation	1.94	1.63	1.68	1.24

Methods and Materials

Participant Recruitment
We recruited 26 study participants who work within EMS from four agencies. These agencies included urban, suburban, inner city, and rural service areas. To maintain participant privacy, neither the location worked, or agency are revealed here. Participants included both EMTs and paramedics. No distinction was made between the two for data collection. Overtime shifts were excluded from study. After an initial screening for participation, individuals who had an outstanding disciplinary record and/or had not been working in the field for more than three months were excluded from this study. Similarly, individuals who did not fill out at least 5 responses were excluded from the final data set.

Study Questionnaire
Study participants completed a X-question questionnaire immediately following shift work. A standardization sheet accompanied each questionnaire to ensure consistency in responses across participants. The standardization sheet explained each answer choice, listed common symptoms, and provided guidelines to follow. It coincided question to question with the questionnaire. Both the questionnaire and standardization sheet were based on the Pittsburgh Sleep Quality Index (PSQI) and Chalder Fatigue Questionnaire (CFQ) (1,2). The questions in the PSQI and the CFQ were adapted for the purposes of this study by excluding at-home sleep options and focusing on occupational sleep. The questionnaire was administered for five months. Individuals were monitored as they conducted questionnaires and confirmed whether they had an understanding of what each answer on the questionnaire meant. In order to be included in the final dataset, each participant must have completed at least five entries. The questionnaire was not available to the public to avoid response bias, and individuals who worked on the same shift were able to complete questionnaires.

Results

The first statistical test conducted examined the difference between the amount EMS personnel that were not receiving the recommended amount of sleep against the proportion of the general population that were not receiving the recommended amount of sleep. This data was obtained from the CDC and their Behavioral Risk Factor Surveillance System (BRFSS) (7). For this, we compared the proportion of EMS providers that were receiving less than the recommended amount of sleep against the general population in the region they were serving based on BRFSS data. In the region where EMS workers in this study operated, 0.33 of the general adult population did receive the recommended amount of sleep. Relative to the general population, 0.97 of EMS workers did not receive the recommended amount of sleep based on the hours that they reported (8). The EMS workers were compared to the general population (one proportion z-test = 16.7 +/- 1.96 , p- <0.00001). When compared against the general adult population, while on the job, EMS workers slept significantly less.
The second statistical test compared the average amount of sleep that EMS providers were receiving against the recommended amount from the CDC. The current guidelines from the CDC recommend 7 hours or more for adults ages 18-60. When this value was compared against the EMS workers using a one-sample t-test the p value was < 0.00001 with a T statistic of -24.5, as well as the observed effect size being 1.99 indicating that there was a large difference between the two groups compared. From this it is evident that when compared to the ideal amount of sleep that adults should be receiving EMS clinicians received significantly less sleep than the recommended amount per health authorities.
EMS workers across the three socioeconomic service areas (low, middle, high) obtained significantly different amounts of sleep during shift work (ANOVA F = 48, p-value <1.11e-16).. The Tukey HSD test reveals that when the low socioeconomic group was compared to the middle socioeconomic group, the p-value associated with the differences was 4.37e-10 indicating that there was a significant difference between the amount of sleep individuals working in high or low socioeconomic areas received. Similarly, the Tukey HSD test revealed that a comparison between the low socioeconomic group to that of the high socioeconomic group had a p-value that was also equal to 8.47e-11. This shows that there was a significant difference in the amount of sleep obtained by EMS personnel between groups in low and high socioeconomic areas as well. When we compared the middle socioeconomic area to that of the high socioeconomic group, the Tukey HSD value was 0.0043. This value indicates that there was also a significant difference between the two groups in high and middle socioeconomic groups. The ANOVA test showed that there was a significant difference within the three categories, and a further examination of the Tukey HSD test shows that all of these groups when compared against each were significantly different.
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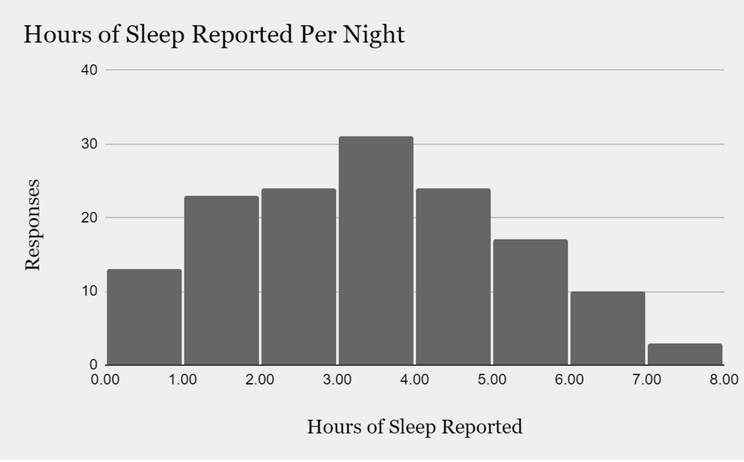

Chart 1. Graphical Representation of All Entries.

Discussion

These findings indicate the dangers of the job to EMS personnel who often suffer negative consequences due to their profession. The reports of inadequate sleep, fatigue, mental health damage, and use of stimulants are all associated with both short-term and chronic illnesses such as heart disease, high blood pressure, diabetes, and insomnia [3,4]. In addition, our findings indicate that the negative effects of sleep conditions on the job in EMS are exacerbated in lower socioeconomic areas that receive a significantly different level of sleep from those of higher socioeconomic areas. This adds an increased risk to those living in these areas that are already more likely to be influenced by other environmental, sociological, and health care factors [5]. Most studies done on EMS have been conducted prior to the coronavirus pandemic. Medicine, but especially emergency medicine, has changed significantly since the pandemic and this has caused greater call volume and rates of burnout [6]. Through documenting the sleep habits of EMS workers in more recent years, providing a more comprehensive understanding of the job, and investigating EMS sleep amount within different socioeconomic areas, better information is obtained about how both EMS workers, themselves, as well as the public which they serve can be benefited.

Conclusions

Prehospital care clinicians continue to be understaffed and, to resolve some of the issues that have occurred to EMS workers, proper staffing must be provided. With proper staffing the amount of sleep increases and therefore individuals would be reduced in different effects. Proper staffing allows for a safer environment for both EMS personnel and the general public that they serve. It is also recommended that employers phase out the 24-hour schedule system and adopt 12 hour shifts similar to other professions such as nursing and power that also require year-round coverage. In this case, even if individuals do not receive adequate sleep, it is due to personal choice, allowing for them to be held accountable, rather than the current systemic issue. In addition, we recommend that agencies pursue proper fatigue recognition for EMS personnel allowing earlier signs of fatigue to be recognized and therefore prevent accidents. Individuals should be properly allowed rest time as well as recognition of when they are too tired to provide proper service. From a company perspective, this would also cut costs in vehicle damage and malpractice. With these changes there would be greater safety for the public and EMS clinicians.

Contact

Michael Ashkinadze
University of California, Los Angeles
Email: mashkinadze@g.ucla.edu
Phone: 323-397-2903

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