

# Sleep Quality among Emergency Team Members and its Associated Factors in the Military Hospitals

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## ABSTRACT

**Introduction:** Sleep disturbances are common phenomena among healthcare providers, especially those working in high demanding environment such as emergency department. Previous studies have shown that poor sleep quality reached high level and could lead to negative consequences. Several demographical and psychological factors have demonstrated their associations with poor sleep quality. In Jordan; insufficient studies have investigated sleep quality level and associated factors among emergency team members, additionally this study represents the first attempt to report sleep quality level and its associated factors.

**Objective:** To determine the prevalence of poor sleep quality and its associated factors among emergency nurses and physicians' in Royal Medical Services hospitals.

**Methods:** Cross-sectional correlational study design was adopted, the emergency nurses and physicians were selected through convenience sampling from four military hospitals, a total of 210 (65 physicians, 145 nurses) were surveyed; the data regarding sleep quality and workload were collected through valid questionnaires (Pittsburgh Sleep Quality Index and Task Load Index). Descriptive statistics were used to represent the categorical and scale data, bivariate correlation analysis was used to find the relationship between participants' characteristics and sleep quality level, multiple linear regression was used to build a model to predict sleep score.

**Results:** The majority of participants were female healthcare providers (60.0%), held bachelor degree (79.0%), married (84.8%), work on rotational shift (72.4%) and had high workload level (Mean=77.74). The sample mean age was (31.63 years) and working experience (6.5 years).

Out 210 participants, 182 (86.7%) had poor sleep quality (score >5), the final regression model showed the workload, working on rotational shift, not attending time management courses, low work experience, younger in age and the nurses' reported higher poor sleep quality with 49.2% of variance is explained. The gender and education level had no significant correlation.  $p > 0.05$

**Conclusion:** the prevalence of poor sleep quality was high among frontline healthcare providers emphasizing they need attention to avoid negative consequences of sleep deprivation, these results confirmed on the importance of performing further studies and establishing mitigation strategies to enhance their sleep level.

**Keywords:** sleep quality, workload, emergency team, sleep disturbances and deprivation

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## INTRODUCTION

that the more experienced individuals showed more sleep disturbances but this due to the variation of the sample size between experience categories. In contrast Suleiman et al<sup>(6)</sup> reported the working experiences had no significant correlation with sleep quality.

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The current findings, showed those received training courses in time or sleep management exhibited lower poor sleep score than those who do not attend and could explained by the fact such training enhances individuals' way of thinking in terms or balance their sleep and adjust with tension stressor. It's worth noting that the effect of this factor was not reported in the literature, as no study investigated the effect of such courses. However Suleiman et al <sup>(6)</sup> found no association between sleep quality and emergency courses such as life support.

The workload has demonstrated a positive correlation with poor sleep quality , this comes a matter of fact that the workload may increase fatigue level, which in turn can reduce the ability to get adequate sleep and it's worth noting that the factor was not captured directly in previous studies. However, it reported that long working hours and fatigue level were significantly correlated with poor sleep quality <sup>(36-37)</sup>. Further, Weaver et al <sup>(38)</sup> found high demanding work environment such as emergency department has correlated with poor sleep quality and quantity

Our regression analysis has shown that, neither marital status, education level nor gender exhibit a significant correlation with sleep disturbances and these results have agreed with Suleiman et al <sup>(6)</sup> and Han et all <sup>(26)</sup>  $p>0.05$ , However our bivariate correlation showed that married and less educated had a higher score of sleep alternation, this may explained by the fact that married healthcare providers have dual roles as family caregivers and employees. Additionally the less educated may struggle to manage their work and balance their sleep due to insufficient knowledge or skill they have, besides in bivariate correlation, the shared relationship between two variables are examined without controlling for the effect of other variables as in regression

Finally, this study considers the first study conducted in Jordan involved both emergency nurses and physicians, the finding revealed that the nurses reported higher poor sleep quality than the physicians, this could explain by the fact of the variation of sample size between both groups. However this result was consistent with other global studies showed that the nurses reported higher sleep disturbances than the physicians <sup>(6-7, 13-19)</sup>

## **Limitations**

The study's limitation may stem from its' design which the temporal relationship between independent and dependent variables cannot be guaranteed, the sleep quality and workload were measured on subjective bases through using self-reporting which may decrease the accuracy of obtained responses due to misunderstanding questions or not taking the survey seriously. Another limitation could effect was recall bias, since there were some questions required the respondents to recall some information during the last month which may have the possibility to over or under reporting. Moreover the study included emergency members who disclosed to participate voluntarily, the voluntary participation may effect on study findings generalizability, since the emergency team members who were unwilling to take place may differ from those did take part. The final limitation is, the participants' psychological state (stress, anxiety) were not measured through the survey, and we might think such trait could interfere with self-reporting toward either sleep quality or workload level.

## **Conclusion**

The study concluded that poor sleep quality is common trait among emergency team members and it reported in high percentage 86.7%. In final regression model, the poor sleep quality was not affected by married status and educational level, while having high workload level, did not attend any training courses and working on rotational fluctuation reported higher poor sleep quality level than their counterparts. In contrast, being older in age and having more experience in work and being physicians demonstrated lower poor sleep quality. Thus sleeping, workload and time management interventions are advisable.

## Recommendations

Further studies are needed to examine sleep quality and associated factors among emergency team members in different healthcare sectors in Jordan not only the military hospitals, besides future studies may suggestible to measure the consequences of sleep disturbances on emergency team members' quality of life , job productivity and patient safety . Mitigating interventions are required to enhance their sleep level

## Study findings implications

The frontlines healthcare providers (emergency nurses and physicians) are at risk for sleep disturbances, therefore experiencing of poor sleep quality may cause several physical and mental disorders which lead to commit medical mistakes.

Table (I) Emergency team members socio-demographical characteristics N=210

Variables	Categories	Frequency	Percentage
Gender	Male	84	40.0
	Female	126	60.0
Level of education	Diploma	31	14.8
	Bachelor	166	79.0
	Higher degrees	13	6.2
Marital status	Single	32	15.2
	Married	178	84.8
Working shift	Rotational shift	152	72.4
	Night shift	58	27.6
Do you receive any previous courses in time or sleep management	Yes	39	18.6
	No	171	81.4
Professions	Physician	65	31.0
	Nurse	145	69.0
Years of experience in ER		6.5±4.41	
Age /years Mean±SD		31.63±3.49 (22.0-41.0)	

**Table II: Sleep quality of emergency team members' N=210**

Components	Normal dysfunction	Mild dysfunction	Moderate dysfunction	Sever dysfunction	Component's Mean $\pm$ SD
Subjective sleep quality	Very good	Fairly good	Fairly bad	Very bad	1.70 $\pm$ 0.75
	36(17.1%)	33(15.7%)	97(46.2%)	44(21.0%)	
Sleep latency	$\leq$ 15 minutes	16–30 minutes	31–60 minutes	>60 minutes	0.91 $\pm$ 0.62
	70(33.3%)	92(43.8%)	42(20.0%)	6(2.9)	
Sleep duration	> than 7 hours	6–7 hours	5–6 hours	< than 5 hours	1.73 $\pm$ 0.61
	12(5.7%)	46(21.9%)	136(64.8 %)	16(7.6%)	
Habitual sleep efficiency	>85.0%	75-85%	65-74%	<65%	1.33 $\pm$ 0.88
	45(21.4%)	57(27.1%)	99(47.1%)	9(4.3%)	
Sleep disturbance	Never	1-9	10-18	19-27	1.64 $\pm$ 0.79
	15(7.1)	52(24.8%)	135(64.3%)	8(3.8%)	
Use of sleep medication	Not during the past month	Less than once a week	Once or twice a week	Three or more times each week	0.83 $\pm$ 0.79
	93(44.3%)	64(30.4%)	46(21.9%)	7(3.3%)	
Daytime dysfunction	Never	1-2	3-4	5-6	1.71 $\pm$ 0.74
	33(15.7%)	28(13.3%)	114(54.3%)	35(17.6%)	
Global sleep quality	Good		Poor		9.85 $\pm$ 2.3 Range: 2-18
	$\leq$ 5.0		>5.0		
	28(13.3%)		182 (86.7%)		

**Table III:** Relationship between sleep quality and emergency team members’ socio-demographical characteristics

Variables	Correlation	Correlation coefficient	p-value
Marital status Married coded 1 Single coded 0	Point biserial	0.216	0.012
Working shift Rotational coded 1 Night coded 0	Point biserial	0.377	<0.001
Do you receive any previous courses in time or sleep management No coded 1 Yes coded 0	Point biserial	0.228	0.005
Workload	Pearson	0.435	<0.001
Professions Physician coded 1 Nurse coded 0	Point biserial	-0.301	<0.001
Level of education	Spearman rho	-0.163	0.036
Years of experience in ER	Pearson	-0.319	<0.001
Age /years	Pearson	-0.248	0.002
Gender	Point biserial	0.081	0.360

Correlation range: 0.00-0.19 very weak, 0.20-0.39 weak, 0.40-0.59 moderate, 0.6-0.79 strong, >0.8 very strong

rpb= point biserial correlation , r= Pearson correlation, rs= Spearman correlation, ns: not significant

**Table IV:** multiple linear regression analysis test results of predicting emergency team members’ sleep quality

Predictors	B coefficients	Standard Error	Beta coefficients	t-value	p-value
Workload score	0.186	0.049	0.241	3.757	0.001
Working shift Rotational coded 1 Night coded 0	0.138	0.046	0.193	3.020	0.003
Attending training courses in time, sleep management No coded 1 Yes coded 0	0.149	0.051	0.177	2.903	0.004
Age	-0.147	0.061	-0.146	2.395	0.018
Years of experience in emergency ward	-0.099	0.043	-0.128	2.308	0.022
Professions Physician coded 1 Nurse coded 0	-0.094	0.042	-0.126	2.248	0.026

F(6,203)=34.719,p<0.001, R2= 50.7% adjR2= 49.2%

## **Policy and administrative implication**

The findings of the study may offer a convincing evidence for those in administrative positions to generate policy that help emergency team members enhance their sleep levels, this could involve adjusting the work shift hours, treat any staff shortages and amend the allocation of the number of assigned patients.

## **Educational implication**

Poor sleep quality level among emergency team members may serve a benchmark to include a time management, sleep and workload management courses regularly, this responsibility can be assigned to training and coordination officer in each department.

## **Clinical implication**

The low level of sleep quality may associate with committing fatal medical errors, threat patients' safety and eliminate the provided quality of care in emergency department.

## **Future research implication**

Further studies are needed to address the study limitations, in terms of inclusion all healthcare sectors' emergency departments, additionally there is a need to explore the negative consequences of sleep on healthcare providers' life, job performance and patients' safety. Experimental studies are preferable to investigate the effectiveness of time or sleep management training course on sleep quality using intervention and control groups.

## **Availability of study raw data and tools:**

All collected data are stored in SPSS file and available upon request and the study instruments' were included in the manuscript. Appendix (C&D)

## **Conflicts of interest**

The author declares that there are no affiliations or any direct or indirect connection with any

Institution that holds a financial or non-financial interest that could potentially influence the research ongoing or results interpretation.

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Author contributions: All authors made a different contribution to various aspects of the study

AD: Conducted introduction, literature review and methodology part

MD: Received the raw data from the helpers in different hospital locations, assisted in data collection, entry and cleaning

MA: Extracted the relevant articles, photocopying study tools, shaping the manuscript according to APA academic writing

AA: Performed data analysis, interpreted the findings

EK: Supervised the entire research project, provided critical revision to the entire manuscript and assisted in writing the abstract

SK: created the electronic survey and conducted the discussion part

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## Appendix (A) Theoretical and operational definition

Variable	Theoretical definition	Operational definition
Sleep quality	sleep quality is subjectively defined as the degree to which an individual subjectively perceives their sleep, considering factors such as sleep latency, total sleep time, sleep efficiency, and the presence of sleep disturbances	Measured using Pittsburgh Sleep Quality Index
Subjective Sleep Quality (Subscale 1)	Evaluate the emergency members' perception of their overall sleep quality during the past month	A higher score indicates poorer subjective sleep quality, while a lower score reflects better subjective sleep quality
Sleep Latency (Subscale 2)	Measure the time it takes for participants to fall asleep after going to bed.	A higher mean score indicates a longer time to fall asleep, while a lower mean score suggests a shorter time to fall asleep
Sleep Duration (Subscale 3)	Assess the total time participants spend asleep during the night.	A higher mean score reflects shorter sleep duration, while a lower mean score indicates longer sleep duration
Habitual Sleep Efficiency (Subscale 4)	Evaluate the proportion of time participants actually spend asleep while in bed.	A higher mean score signifies lower habitual sleep efficiency, while a lower mean score indicates higher efficiency
Sleep Disturbances (Subscales 5)	Identify the frequency of various sleep disturbances such as difficulty breathing, coughing, bad dreams, etc	Higher mean scores indicate more frequent disturbances, while lower mean scores suggest fewer disturbances
Sleep Medication Usage (Subscale 6)	Determine the frequency of using sleep medication to help with sleep	A higher mean score indicates more frequent use of sleep medication, while a lower mean score suggests less frequent use.
Daytime Dysfunction (Subscale7)	Assess the impact of sleep problems on daytime functioning, including difficulty staying awake and being alert	Higher mean scores indicate more severe daytime dysfunction, while lower mean scores suggest less impact on daytime functioning
Workload	number and complexity of activities and tasks that nurses must perform when caring for patients	NASA Task Load Index (NASA-TLX)

**Appendix (B) proportional allocation of the sample size**

Locations	Physicians	Required to draw	Nurses	Required to draw	Final sample size
King Hussein Medical City	40	34	102	65	Physicians 65
Prince Rasheed Bin AL-Hassan hospital	15	13	47	30	
Prince Hashem Bin Abdullah Hospital	12	10	42	27	Nurses 145
Prince Hashem Bin Al-Hussein Hospital	10	8	37	24	
<b>Total</b>	<b>77</b>	<b>65</b>	<b>228</b>	<b>145</b>	<b>Total 210</b>

**(Appendix C)**

**A- Pittsburgh Sleep Quality Index (PSQI)**

The following questions relate to your usual sleep habits during the past month only. Your answers should indicate the most accurate reply for the majority of days and nights in the past month. **Please answer all questions.**

1. During the past month, what time have you usually gone to bed at night? \_\_\_\_\_
2. During the past month, how long (in minutes) has it usually taken you to fall asleep each night?
3. During the past month, what time have you usually gotten up in the morning? \_\_\_\_
4. During the past month, how many hours of actual sleep did you get at night? (This may be different than the number of hours you spent in bed.) \_\_\_\_\_

5. During the <u>past month</u> , how often have you had trouble sleeping because you...	Not during the past month 0	Less than once a week 1	Once or twice a week 2	Three or more times a week 3
a. Cannot get to sleep within 30 minutes				
b. Wake up in the middle of the night or early morning				
c. Have to get up to use the bathroom				
d. Cannot breathe comfortably				
e. Cough or snore loudly				
f. Feel too cold				
g. Feel too hot				
h. Have bad dreams				
i. Have pain				
j. Other reason(s), please describe:				
6. During the past month, how often have you taken medicine to help you sleep (prescribed or "over the counter")?				
7. During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activity?				
	No problem at all	Only a very slight problem	Somewhat of a problem	A very big problem
8. During the past month, how much of a problem has it been for you to keep up enough enthusiasm to get things done?				
	Very good	Fairly good	Fairly bad	Very bad
9. During the past month, how would you rate your sleep quality overall?				
	No bed partner or roommate	Partner/roommate in other room	Partner in same room but not same bed	Partner in same bed
10. Do you have a bed partner or roommate?				
	Not during the past month	Less than once a week	Once or twice a week	Three or more times a week
If you have a roommate or bed partner, ask him/her how often in the past month you have had:				
a. Loud snoring				
b. Long pauses between breaths while asleep				
c. Legs twitching or jerking while you sleep				
d. Episodes of disorientation or confusion during sleep				
e. Other restlessness while you sleep, please describe:				

**(Appendix D)**

**B- (NASA-TLX)**

This tool refers to the workload while performing a task. Click on each scale at the point that best reflects your experience with the task.

**1- Mental demand:** how much thinking, deciding, or calculating was required to perform task?

<b>Low</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>	<b>13</b>	<b>14</b>	<b>15</b>	<b>16</b>	<b>17</b>	<b>18</b>	<b>19</b>	<b>20</b>	<b>High</b>	

**2- Physical demand:** the amount and intensity of physical activity required to complete task.

<b>Low</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>	<b>13</b>	<b>14</b>	<b>15</b>	<b>16</b>	<b>17</b>	<b>18</b>	<b>19</b>	<b>20</b>	<b>High</b>	

**3- Temporal demand:** – the amount of time pressure involved in completing the task.

<b>Low</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>	<b>13</b>	<b>14</b>	<b>15</b>	<b>16</b>	<b>17</b>	<b>18</b>	<b>19</b>	<b>20</b>	<b>High</b>	

**4- Effort:** how hard does the participant have to work to maintain their level of performance?

<b>Low</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>	<b>13</b>	<b>14</b>	<b>15</b>	<b>16</b>	<b>17</b>	<b>18</b>	<b>19</b>	<b>20</b>	<b>High</b>	

**5- Performance:** the level of success in completing the task.

<b>Perfect</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>	<b>13</b>	<b>14</b>	<b>15</b>	<b>16</b>	<b>17</b>	<b>18</b>	<b>19</b>	<b>20</b>	<b>Failure</b>	

**6- Frustration level:** how insecure, discouraged, or secure or content the participant felt during the task.

<b>Low</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>	<b>13</b>	<b>14</b>	<b>15</b>	<b>16</b>	<b>17</b>	<b>18</b>	<b>19</b>	<b>20</b>	<b>High</b>
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