One Health Bulletin 2024;4(3): 133−138

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Original Article

One Health Bulletin

Exploration and analysis of anxiety and sleep disorders among medical personnel in medical observation and isolation sites

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ABSTRACT

Objective: This study aims to assess the mental well-being and factors that influence medical personnel engaged in safeguarding tasks at medical observation and isolation sites amid COVID-19 prevention efforts in Qingpu District, Shanghai. The findings will provide evidence to inform the development of effective preventive strategies.

Methods: A survey employing the Self-Rating Anxiety Scale (SAS), Pittsburgh Sleep Quality Index (PSQI), and a custom basic information questionnaire was conducted among medical personnel stationed at medical observation isolation sites in Qingpu District, Shanghai, during COVID-19 pandemic.

Results: Out of the 379 medical personnel surveyed, 132 individuals (34.8%) exhibited symptoms of anxiety, while 252 individuals (66.5%) reported sleep disorders. The multivariate logistic regression analysis revealed that sex (*OR*=2.44, 95%*CI*: 1.28-4.65) and living with elderly (*OR*=1.64, 95%*CI*: 1.03-2.62) significantly affected the anxiety levels among healthcare workers. Although five variables including age, marital status, professional title, living with children, and living with elderly were examined for their impact on sleep quality, none of these factors showed statistically significant differences.

Conclusions: During the COVID-19 pandemic, anxiety symptoms and sleep disorders among medical personnel stationed at medical observation isolation sites varied based on sex, age, marital status, education level, professional title, and living arrangements. These findings underscore the importance of addressing these concerns and implementing measures to enhance and alleviate anxiety and sleep disorders among medical personnel in isolation settings.

KEYWORDS: Medical observation isolation sites; Medical personnel; Anxiety; Sleep disorders

1. Introduction

The COVID-19 pandemic, marked by its high contagion rate, rapid dissemination, and severe symptoms, has quickly spread across nations and continents, drawing significant attention from countries globally[1−2]. Before January 8, 2023, COVID-19 was designated as a “Class B infectious disease”, but was subject to the prevention and control measures of a "Class A infectious disease". Consequently, centralized medical observation points, commonly known as “isolation points”, were established in cities nationwide to monitor cases, close contacts, other medium and high-risk individuals.

The isolation points in Shanghai handle the medical observation of inbound travelers, local close contacts, and secondary close contacts. Medical staff at these locations are responsible for receiving individuals under observation, transferring suspected cases, collecting nucleic acid samples, and providing guidance on disinfection and protection. Due to their high-risk exposure, these staff members often face psychological stress and work pressure,which can lead to mental health issues such as anxiety and insomnia.

Significance

During the COVID-19 outbreak, medical staff at isolation sites typically faced intense working conditions and significant psychological stress.This study systematically evaluated the levels of anxiety and corresponding sleep quality of healthcare workers at these isolation sites during the COVID-19 pandemic. It investigates the factors affecting anxiety and sleep disorders, providing recommendations to improve their health, ensuring efficient prevention and control efforts and aiding the normalization of social production and daily life.

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How to cite this article: Ma YD, Zhou HR, Zhang ZC, Liu QQ, Lin CP. Exploration and analysis of anxiety and sleep disorders among medical personnel in medical observation and isolation sites. One Health Bull 2024; 4(3):133-138. doi: 10.4103/ohbl.ohbl_23_24

Article history: Received 6 May 2024 Revision 11 June 2024 Accepted 25 June 2024 Available online 5 July 2024

This study conducted a cross-sectional survey and analysis using questionnaires completed by 379 medical staff from 12 community health service centers in Qingpu District, Shanghai, who were involved in isolation point operations. The study also explored potential coping measures to address these challenges.

2. Objectives and methods

The survey subjects were medical staff assigned to isolation points in Qingpu District, Shanghai in 2022. An online survey was conducted using the Question Star platform.

The general information collected data on sex, age, education, job title, job position, marital status, family living situation, working hours at the isolation point, and job responsibilities.

The Self-Rating Anxiety Scale (SAS)[3] was used to assess participants' subjective feelings of anxiety and any changes during treatment. A standard total score below 50 indicates no anxiety symptoms; a score between 50 and 59 indicates mild anxiety; a score between 60 and 69 indicates moderate anxiety; and a score of 70 or higher indicates severe anxiety.

The Pittsburgh Sleep Quality Index (PSQI)[4] consists of 18 items, which were divided into 7 factors. Each factor is scored from 0 to 3, with a total score ranging from 0 to 21. Higher total scores indicate poorer sleep quality, with a score above 7 serving as the reference threshold for sleep quality.

Data were entered into Excel and analyzed using SPSS 22.0. The chi-square test was used for comparing results, with a significance level set at $P<0.05$ indicating statistical significance.

Prior to participation in the study, all subjects were provided with an informed consent form detailing the purpose, procedures, potential risks, and benefits of the research.

3. Results

3.1. Basic information

A total of 379 individuals participated in this survey. The basic demographic and professional details are presented in Table 1.

3.2. Status of individuals experiencing anxiety symptoms

Out of the 379 respondents, 247 did not exhibit anxiety symptoms, while 132 did, resulting in a detection rate of 34.8% (132/379), a significantly different result (χ^2=13.28, $P<0.01$). Among those experiencing anxiety, 76 individuals (20.1%) reported mild symptoms, 28 individuals (7.4%) had moderate symptoms, and 28 individuals (7.4%) had severe symptoms, as depicted in Figure 1. The survey findings indicated that females exhibited higher levels of anxiety compared to males, with a statistically significant difference (χ^2=5.55, P=0.018). Among medical staff aged 30-49, the prevalence of anxiety was higher compared to other age groups, with significant variations observed between different age brackets (χ^2=15.13, P=0.002). Married individuals demonstrated higher levels of anxiety compared to unmarried ones (χ^2=7.60, P=0.006). Anxiety levels did not correlate with profession (clinical doctors, public health physicians, nurses), but individuals with undergraduate and graduate degrees displayed higher anxiety levels compared to those with college degrees (χ^2=7.51, P=0.023). Medical staff with professional titles exhibited higher anxiety levels than those without professional titles (with intermediate-level professional titles showing higher anxiety levels than junior and senior-level professional titles) (χ^2=12.30, P=0.006). Furthermore, medical staff living with children displayed higher anxiety levels compared to those without children (χ^2=7.28, P=0.007), and medical staff living with elderly family members exhibited higher anxiety levels than those without elderly family members (χ^2=8.50, P=0.004). Detailed results are presented in Table 2. A multivariate logistic regression analysis was conducted using the significant factors ($P<0.05$) identified from the univariate analysis in Table 2 as independent variables. The analysis examined seven variables—sex, age, marital status, education, professional title, living with children, and living with elderly—in relation to the anxiety levels of healthcare workers at the isolation site. Specifically, female healthcare workers were 2.44 times more likely to experience anxiety symptoms compared to male counterparts (χ^2=7,41, OR=2.44, 95%CI: 1.28-4.65, P=0.007), and those living with elderly were 1.64 times more likely to experience anxiety symptoms compared to those not living with elderly (χ^2=4.34, OR=1.64, 95%CI: 1.03-2.62, P=0.037). There was no statistically significant difference observed in the other factors. Among these, age was negatively correlated with anxiety symptoms, but this correlation was not statistically significant, as shown in Table 3.

3.3. Sleep disorders among medical staff at medical observation isolation sites

In this survey, the global PSQI score (total score) ranges were from 1 to 21, each of the 7 components has a score range of 0-3 points. A survey of 379 medical personnel at the isolation site revealed that 66.5% (252/379) of the medical professionals had a PSQI score of more than 7 points, which indicated the presence of sleep disorders. And the specific scores for the different components of the PSQI are illustrated in Table 4.

The survey findings suggest that sleep disorders are not influenced by sex, profession, or education level. However, healthcare workers aged 30-39 exhibited a higher detection rate of anxiety compared to other age groups, accounting for 45.2% (114/252) of the total number of anxious persons, with significant discrepancies observed across age brackets (χ^2=13.97, P=0.003). There was a disparity in sleep disorders between married and unmarried individuals (χ^2=10.49, P=0.002), and professional titles were associated with sleep disorders, with higher titles correlating with more severe sleep disorders (χ^2=12.90, P=0.005). Additionally, variations in sleep disorders were noted between healthcare workers living with and without children (χ^2=8.62, P=0.003) as well as between those living with and without elderly family members (χ^2=8.00, P=0.006), as

detailed in Table 5. A multivariate logistic regression analysis was conducted using the significant factors (P<0.05) identified from the univariate analysis in Table 5 as independent variables. The analysis examined five variables—age, marital status, professional title, living with children, and living with elderly—in relation to the quality of sleep among healthcare workers at the isolation site. However, the differences observed were not statistically significant, as shown in Table 6.

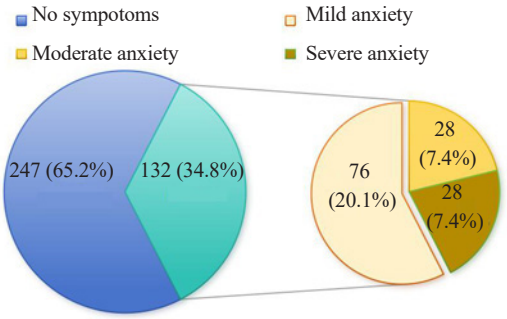


Figure 1. Anxiety levels distribution of among medical staff.

Note: Anxiety is assessed using Self-Rating Anxiety Scale (SAS) with 50 indicating no anxiety, 50 to 59, mild anxiety, 60-69 moderate anxiety,and ≥70, severe anxiety.

Table 1. Characteristics of medical personnel.

Various	*n* (%)
Sex	
Male	67(17.7)
Female	312(82.3)
Age (years)	
18-29	72(19.0)
30-39	164(43.3)
40-49	112(29.6)
≥50	31(8.2)
Marital status	
Married	314(82.8)
Not married	65(17.2)
Professional	
Clinician	169(44.6)
Nurse	128(33.8)
Public health doctor	82(21.6)
Education	
Junior College and below	52(13.7)
Undergraduate	304(80.2)
Graduate or above	23(6.1)
Professional title	
Without	22(5.8)
Elementary	136(35.9)
Intermediate	194(51.2)
Advanced	27(7.1)
Living with children	
Yes	272(71.8)
No	107(28.2)
Living with elderly	
Yes	188(49.6)
No	191(50.4)

Table 2. Anxiety levels among medical staff at isolation points [*n*(%)].

Various	Anxiety symptoms	No anxiety	χ^2	*P*
Sex				
Male	15(22.4)	52(77.6)	5.55	0.018
Female	117(37.5)	195(62.5)		
Age (Years)				
18-29	13(18.1)	59(81.9)	15.13	0.002
30-39	68(41.5)	96(58.5)		
40-49	44(39.3)	68(60.7)		
≥50	7(22.6)	24(77.4)		
Marital status				
Married	119(37.9)	195(62.1)	7.60	0.006
Not married	13(20.0)	52(80.0)		
Professional				
Clinician	58(34.3)	111(65.7)	5.53	0.063
Nurse	53(41.4)	75(58.6)		
Public health doctor	21(25.6)	61(74.4)		
Education				
Junior college and below	11(21.2)	41(78.8)	7.51	0.023
Undergraduate	116(38.2)	188(61.8)		
Graduate or above	5(21.7)	18(78.3)		
Professional title				
Without	2(9.1)	20(90.9)	12.30	0.006
Elementary	40(29.4)	96(70.6)		
Intermediate	81(41.8)	113(58.2)		
Advanced	9(33.3)	18(66.7)		
Living with children				
Yes	106(39.0)	166(61.0)	7.28	0.007
No	26(24.3)	81(75.7)		
Living with elderly				
Yes	79(42.0)	109(58.0)	8.50	0.004
No	53(27.7)	138(72.3)		

Table 3. Multivariate logistic regression analysis of factors affecting levels of anxiety in medical staff (n=379).

Various	β	Standard error	χ^2	*OR*	95%*CI*	*P*
Sex	0.893	0.33	7.41	2.44	1.28-4.65	0.007
Age (Years)	-0.084	0.16	0.27	0.92	0.67-1.26	0.604
Marital status	0.477	0.45	1.15	1.61	0.67-3.85	0.284
Education	0.249	0.30	0.71	1.28	0.72-2.30	0.402
Professional title	0.352	0.20	3.19	1.42	0.97-2.09	0.074
Living with children	0.226	0.36	0.39	1.25	0.61-2.56	0.535
Living with elderly	0.496	0.24	4.34	1.64	1.03-2.62	0.037

Table 4. Descriptive statistics of Pittsburgh Sleep Quality Index scores (n=379).

Various	score						Mean±SD	Min~Max
	0	1	2	3	0~7	8~21		
Global PSQI score (Total score)	/	/	/	/	127	252	9.71±4.11	1~21
Subjective sleep quality	15	113	195	56	/	/	1.77±0.74	0~3
Sleep latency	32	126	131	90	/	/	1.74±0.92	0~3
Sleep duration	28	197	93	61	/	/	1.49±0.85	0~3
Habitual sleep efficiency	132	110	74	63	/	/	1.18±1.08	0~3
Sleep disorders	19	231	100	29	/	/	1.37±0.70	0~3
Use of sleeping medications	302	39	17	21	/	/	0.36±0.81	0~3
Daytime dysfunction	38	106	126	109	/	/	1.81±0.97	0~3

Table 5. Sleep status of medical staff at the isolation points [*n*(%)].

Various	Sleep well	Sleep disorders	χ^2	*P*
Sex				
Male	29(43.3)	38(56.7)	3.49	0.065
Female	98(31.4)	214(68.6)		
Age(Years)				
18-29	37(51.4)	35(48.6)	13.97	0.003
30-39	50(30.5)	114(69.5)		
40-49	29(25.9)	83(74.1)		
≥50	11(35.5)	20(64.5)		
Marital status				
Married	94(29.9)	220(70.1)	10.49	0.002
Not married	33(50.8)	32(49.2)		
Professional				
Clinician	56(33.1)	113(66.9)	4.77	0.092
Nurse	36(28.1)	92(71.9)		
Public Health Doctor	35(42.7)	47(57.3)		
Education				
Junior college and below	21(40.4)	31(59.6)	5.61	0.060
Undergraduate	94(30.9)	210(69.1)		
Graduate or above	12(52.2)	11(47.8)		
Professional title				
Without	15(68.2)	7(31.8)	12.90	0.005
Elementary	45(33.1)	91(66.9)		
Intermediate	59(30.4)	135(69.6)		
Advanced	8(29.6)	19(70.4)		
Living with children				
Yes	79(29.0)	193(71.0)	8.62	0.003
No	48(44.9)	59(55.1)		
Livng with elderly				
Yes	50(26.6)	138(73.4)	8.00	0.006
No	77(40.3)	114(59.7)		

Table 6. Results of logistic regression analysis of factors affecting sleep disorders in medical staff (*n*=379).

Influencing factors	β	Standard error	χ^2	*OR*	95%*CI*	*P*
Age (Years)	0.101	0.16	0.40	1.11	0.55-2.13	0.527
Marital status	0.467	0.39	1.41	1.60	0.74-3.44	0.234
Professional title	0.166	0.19	0.73	1.18	0.81-1.73	0.392
Living with children	0.077	0.35	0.05	1.08	0.55-2.13	0.824
Living with elderly	0.431	0.24	3.25	1.54	0.96-2.46	0.071

4. Discussion

Working at isolation points entails high intensity, heavy responsibility, stringent requirements, and elevated risks. Apart from medical observation duties, medical personnel also attend to the daily necessities of observed individuals and manage various information reports. Their frequent exposure to high-risk isolation zones, interaction with numerous confirmed cases exhibiting positive nucleic acid tests, and inadequate rest and shifts amplify the mental strain on medical staff. The convergence of various stressors encompassing physical, mental, and environmental factors can precipitate a spectrum of physical and mental health challenges[5,6]. It's advisable to arrange training sessions for non-medical personnel to aid in tasks like information collection and environmental disinfection, thereby alleviating the workload of frontline medical staff. Simultaneously, early psychological support should be offered to medical personnel, alongside stress management techniques and self-regulation practices, to mitigate stress and promote both physical and mental well-being. This approach ensures the delivery of improved medical services[7].

In this study, the rates of anxiety and insomnia among medical staff at isolation points were 34.8% and 66.5%, respectively. These figures exceeded the rates of anxiety (11.2%) and insomnia (23.2%) observed among medical staff in non-isolation point positions[8]. This high prevalence underscores the substancial psychological stress faced by healthcare wokers at such environments. The multivariate logical regression analysis revealed that sex and living with elderly were significant factors of anxiety, suggesting potential advantages for males in emergency response and management. The univariate analysis have identified significant associations between sleep disorders and age, marital status, professional titles, living with children and living with elderly. The medical staff aged 30-39 exhibited a higher detection rate of sleep disorders compared to other age groups. Additionally, married individuals, those with higher professional titles, and those living with children or elderly family members reported more severe sleep disorders. Medical personnel in this age constitute the primary workforce deployed at isolation points, subject to the dual stressors of familial responsibilities and prolonged confinement within enclosed environments. However, the multivariate logical regression analysis for sleep discorders did not exhibited statistically significant results for the variables, suggesting disrupted work-rest patterns and severe sleep deprivation among medical personnel stationed at these sites.

There are several areas where the response to potential new infectious diseases can be enhanced, along with subsequent prevention and control measures in isolation points. As pivotal entities in healthcare provision, medical institutions serve as the "health gatekeepers." Primarily, there's a need to elevate the diagnostic and treatment proficiency of healthcare professionals. Additionally, efforts should focus on bolstering the capacity for infectious disease monitoring and early warning systems. This involves establishing a sophisticated monitoring and early warning mechanism along with an emergency response platform grounded in comprehensive big data sources. These measures aim to enhance early detection, warning, and response capabilities concerning emerging and critical infectious diseases. Moreover, talent pool development warrants attention, emphasizing the creation of robust

talent reserves and honing professionals' skills and attributes through routine competitions and exercises to ensure preparedness for potential emergencies. Finally, employing scientific methodologies, health education initiatives on infectious diseases should be disseminated to medical staff and individuals in isolation, alleviating their apprehensions and anxieties regarding infectious diseases.

The isolation observation sites have played a crucial role in early epidemic prevention and control, effectively mitigating the risk of community transmission that could arise from home isolation practices[9,10]. Appropriate psychological support and compassionate measures should be implemented for medical staff stationed at isolation points, taking into account their physical, mental, familial, and rest-related concerns comprehensively. Nursing staff schedules should be organized in a scientifically and reasonably manner, accompanied by psychological guidance aimed at alleviating work-related stress and fatigue[11]. To achieve efficient, orderly, scientific, and standardized operations at isolation points, aiming for optimal control outcomes within the shortest time frame and at minimal cost, we have formulated the following solutions based on feedback from healthcare workers: 1) Adjust the on-site working hours of relevant staff appropriately, ensuring they are not excessively long. 2) Employ professional personnel to handle information statistics tasks to optimize the conservation of medical resources. 3) Clearly define the responsibilities of each staff member based on their actual duties. 4) Strengthen inter-departmental coordination to facilitate seamless communication. 5) Enhance training programs to ensure the systematic implementation of various tasks. Although this study has not yet explored interventions for healthcare workers, drawing from our experiences, these measures can be applied in various public health emergencies that may occur in the future.

Since the onset of the COVID-19 pandemic, the public health system in China has confronted significant challenges. Despite successful epidemic containment efforts facilitated by close collaboration among public health personnel, medical professionals, and government entities, the crisis has underscored deficiencies and vulnerabilities in the training of public health professionals. Various factors influencing the spread of the novel coronavirus encompass natural elements like climate, geography, soil, flora, fauna, human interactions with the environment, as well as social factors including population mobility, density, hygiene practices, customs, cultural norms, lifestyle choices, and dietary habits. This underscores the interconnectedness of the natural environment, social milieu, and overall ecological landscape. Addressing the increasingly intricate public health issues demands interdisciplinary and interdepartmental cooperation to bolster preventive measures[12]. The "One Health" concept offers a fresh perspective for the global management of abrupt public health crises. As international travel rises and global warming escalates, the incidence of both new and recurring viral outbreaks is becoming increasingly frequent. The "One Health" paradigm presents a novel strategy for addressing global responses to sudden public health crises[13]. This underscores the imperative of cross-sectoral, interdisciplinary collaboration and the adoption of the "One Health" approach for future disease responses. These approaches hold paramount significance in disease prevention and control efforts[14].

5. Conclusions

Throughout the COVID-19 pandemic, there has been a notable decline in the mental well-being of medical personnel stationed at medical observation and isolation sites, characterized by varying levels of anxiety symptoms and sleep disorders. This issue warrants serious attention, prompting the implementation of tailored psychological interventions aimed at enhancing the mental health of medical staff and mitigating anxiety and sleep disorders at isolation points. Furthermore, in future infectious disease prevention and control efforts, it is imperative to integrate the principles of "One Health" into corresponding strategies and actions.

Conflict of interest statement

The authors declare that there is no conflict of interest.

Funding

This study was funded by Scientific Research Project of Science and Technology Commission of Qingpu District, Shanghai (Project No. QKY2022-37).

Data availability statement

The data supporting the findings of this study are available from the corresponding author upon request.

Authors' contributions

Ma YD, Zhou HR and Lin CP designed the study. Ma YD, Zhang ZC and Liu QQ collected the materials. Zhou HR and Ma YD analyzed the data. Ma YD drafted the initial manuscript. Zhou HR and Lin CP contributed to the critical revision of the article. Ma YD, Zhou HR and Lin CP reviewed and edited the content of the whole paper. All authors reviewed subsequent drafts of the manuscript and approved the final version.

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Edited by Qi Y, Liang TC