ARTICLE

Resilience among Pediatric healthcare workers during the COVID-19 pandemic in a tertiary hospital

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Objectives: Healthcare-workers are at the center of the pandemic, dealing with cases while being at risk of acquiring the infection themselves, causing work-related stress. Despite this, they continue reporting for duty. This paper aims to determine the factors that affect resilience of pediatric healthcare-workers in close contact with patients suspected with COVID infection and its association to sleeping disturbance during the first two years of COVID – 19 pandemic in a tertiary hospital in the Philippines.

Methodology: This is a cross-sectional study. Healthcare-workers who render bedside patient care for those suspected or with COVID-19 infection, not diagnosed with any mental health illness, and fit the inclusion criteria were chosen through purposive sampling and asked to answer questionnaires with demographic survey, BRS and PSQI tool.

Results: Among 89 participants, females were predominant (60.67%). Majority were in the 30-39 age group (44.94%) and are nurses (40.45%) or doctors (39.33%) who were single (76.40%). Many have normal resilience as measured from their BRS scores with an average PSQI per category equal to or exceeded 5.00. The correlation coefficient was at -0.338 (p-value 0.001) between the BRS and PSQI scores, indicating that a significant negative correlation exists between the two scores.

Conclusion: Normal resilience was reported in the majority of the healthcare-workers. All study participants had poor sleep quality as determined in the overall average PSQI score. A negative correlation between resilience and sleep quality was observed, denoting that poor sleep quality can be associated with lower resilience, and vice versa. However, temporality cannot be assumed with this study.

Keywords: *resilience, sleep disturbance, COVID-19, pediatric healthcare workers*

INTRODUCTION

The novel coronavirus disease (COVID-19) was officially reported in December 2019 in Wuhan, Hubei Province, China. [1] Since then, it has spread worldwide and many countries still suffer from high cases despite worldwide efforts to vaccinate the population to create herd immunity. Community quarantines were employed in hopes to decrease the rate of transmission all over the world [2] however, new variants are being discovered pushing incidence and transmission rates to increase despite the world's efforts to contain the virus. In the center of this pandemic are the healthcare workers who deal with the increasing number of cases and are at high risk of infection due to the nature of their work hence they experience high levels of work-related stress. Because of the ever-changing health protocols, there is heavy workload causing excessive fatigue, tension, and exhaustion.

[1] Despite this, there are still healthcare workers who chose to continue their work in the frontlines. This paper aims to identify the factors that affect resilience among pediatric healthcare workers in direct contact with patients suspected with COVID infection and its association with sleeping disturbance during the first two years of the COVID – 19 pandemic in a tertiary hospital in the Philippines.

Resilience is the ability of an individual to manage stress and handle difficulties. Stress is defined in this study as a biological and psychological response felt from confronting an event one deems to be harmful or incapable of overcoming. A stressor is the threat one perceives as the cause of the stress. Not everyone who suffers from adversity may have negative psychological effects, some are able to overcome misfortunes and adapt and one of the reasons why they are able to do so is because they are resilient. Resilience may vary depending on different variables like culture, ethnicity, values, environment, skills developed, etc. in every individual. Development of resilience mostly depends on what is needed to successfully thrive in one's environment or situation.[3] However, with the ever-changing health protocols, there is heavy workload causing excessive fatigue, tension, and exhaustion.[1] There are evidence that as one's resilience increases, they are less prone to have sleep disturbances. Resilient people are more patient and adapt better to circumstances which results to better sleep quality. Resilience is a positive indicator for physical and mental health and those with higher resilience have better sleep quality.[3] Based on research on previous outbreaks, there were reports of emotional and psychological distress in healthcare workers which led to increased risk of sleep disturbance.[4,5] A meta-analysis of 17 studies on healthcare workers in China regarding sleep disturbances and quality of healthcare workers during the COVID-19 pandemic concluded that sleep disturbances were common in healthcare workers and the there is a heavy mental burden on them during COVID-19 pandemic.[1] Poor sleep quality may decrease a person's attention span, decision-making ability, and work efficiency which may ultimately lead to poor response to an outbreak. Sleep disturbances include disorders of initiating and maintaining sleep, excessive somnolence, disorders of sleep-wake schedule, and dysfunctions associated with sleep.[6] A social media survey in the United States conducted for healthcare workers also revealed that they have poor sleep, some have insomnia, and over half reported burn out calling for sleep interventions for frontline healthcare workers.[7] In another study conducted in the Philippines, anxiety related to the COVID-19 pandemic was prevalent in the nursing workforce possibly affecting their well-being and work performance, and those with high personal resilience and good social and organizational support reported lower levels of anxiety and stress. [8]

There is a relationship between resilience and sleep quality. As resilience increases, there is better sleep quality in adults.[3] This study will measure the ability of the pediatric healthcare workers in a tertiary hospital in the Philippines to cope with stressful events like the COVID-19 pandemic and determine the factors that might affect their resilience.

Materials and Methodology

This research is a cross – sectional study. The target population is the group of pediatric healthcare workers in PCMC in direct contact with patients suspected and/or confirmed to have COVID-19 infection during the COVID-19 pandemic. In the said institution, not everyone works in direct contact with patients. Some are employed to do bedside care while others do not handle patients and perform solely administrative work. Among those who render patient care bedside, not everyone is in contact with those who are suspected or have COVID-19 infection. Only a select few are assigned to wards with patients who are suspected or infected with COVID-19 infection, i.e., isolation ward, triage, and/or emergency room. Only medical technologists, radiologic technologists, nurses, and doctors who render patient care bedside for those suspected or have COVID-19 infection previously or currently assigned at the COVID ward, triage, and/or ER from April 2020 until present were included. Those diagnosed with mental health illnesses, taking medications, and/or undergoing counseling for the past 6 months were excluded from the study.

The sample size was computed using the formula $n = \frac{Z^2 p(1-p)}{d^2}$ where n is the sample size, Z is the statistic corresponding to level of confidence which is 95%, P is expected prevalence obtained from a similar study which is 45.1% and d is the precision set at 5%. The total population in the institution to be tested which included all medical technologists, radiologic technologists, nurses, and doctors was set at 582. The calculated sample size needed for this study was 231 participants.

Data gathering became problematic because some healthcare workers did not agree to participate in this study while others had disclosed mental illnesses prior to answering the questionnaires and were immediately excluded. Due to the nature of the work, there was difficulty in collecting data from employees who did not go on duty during the time of collection, i.e., those who are on the night shift, since data collection was done only during the day. Out of the 582 total population set in the beginning, there is no data on how many healthcare workers render patient care bedside for those who are suspected or have COVID-19 infection previously or currently assigned at the COVID ward, triage, and/or ER from April 2020 until present. The total population set during the computation of the sample size may be more than the actual number of healthcare workers eligible to participate in the study. Hence, there was difficulty in meeting the said sample size. Identification of subjects was done through purposive sampling within the set data collection period.

The data was gathered by individually asking healthcare workers who fit the inclusion criteria and are willing to answer the questionnaires. They were chosen based on their eligibility according to the inclusion criteria set by the investigator. Once the participants consented in participating in the research, they were asked to answer a general demographic survey and two validated tools that will give the following information:

a) Demographic (age, sex, marital status, occupation, duration of exposure to COVID-confirmed patients)

b) BRS scores

c) PSQI scores

Those participants who did not disclose their mental illness prior to the data collection and answered that they have mental health problems and/or are taking psychotropic medications were excluded from the data processing and analysis.

The BRS has been validated through pretesting across different countries which showed that the tool is acceptable, reliable, and valid across nationalities, cultures, and socio-demographics. In studies done to review and validate resilience measurement scales, BRS tool was among the top 4 that scored high in the validation. The tool scored high on content validity, internal consistency, construct validity, reproducibility reliability, and interpretability among all resilience measurements.[9] This questionnaire has a Cronbach alpha of 0.71 which means that this tool's internal consistency is within the acceptable level of reliability. Pearson correlation of BRS was able to replicate the correlational direction and magnitude of other well-established scales. The confirmatory factor analysis indicated that with a two-factor structure, it met all criteria for a good model fit without correlating the error terms between items.[10] It is in the public domain and may be used in research as long as the authors are properly cited and acknowledged in the paper.

The PSQI tool has been validated and is accepted as a screening tool worldwide for sleep disturbance. It has a sensitivity of 89.6% and specificity of 86.5% and has been translated into 48 languages. It has an internal consistency and reliability coefficient (Cronbach's alpha) of 0.83 for its seven components.[11]

Since the expected participants in this study are healthcare workers in a tertiary hospital i.e., nurses, radiology technologists, medical technologists, and doctors, who are at least college graduates who are expected to have basic English literacy, there is no need to translate both tools into the native language. Although self-administered questionnaires can be empowering, they may also convey inaccuracy when it comes to understanding what is written. Participants may also purposely modify their responses during the data collection knowing that they are part of a study which is called the Hawthorne effect. Such hindrances were addressed by establishing rapport with the participants and being present for possible questions during the data collection.

Upon processing and analysis of the data collected from the questionnaires, those participants identified to have poor resilience with sleep disturbance were informed and advised to consult with a specialist who can help them address their problems. Results from the questionnaire answered by the participants were kept at a designated place for storage, kept confidential, and will be disposed of after 5 years from the publication of the research.

The study was presented to the Philippine Children's Medical Center Institutional Review Board, Ethics Committee and was only pursued upon their approval. Data Privacy Act was implemented in handling all collected data. All soft copy files are password protected and saved in a separate USB which only the researcher has access to, to ensure data privacy and will be deleted and disposed of after 5 years. Each participant was assigned control numbers. After analyzing the data and participants with significant findings have been contacted, the paper-based questionnaires will be kept in an allocated place and will be kept for 5 years then shredded afterward.

Microsoft Excel was used for data entry and documentation using tables. Quantitative variables were summarized as prevalence, means and standard deviation. Using SPSS version 26, one-way ANOVA was done to explore the difference in resilience among different categorical variables, i.e., age, sex, marital status, and occupation while the association between the sleep quality and resilience of pediatric healthcare workers was measured using the Pearson correlation. The level of significance was set at 95%.

RESULTS

A total of 89 participants were included in the study. The following tables describe the results obtained from these participants. From the profile of pediatric healthcare workers, a predominance of female participants was observed, which was 54 or 60.67% of the overall study population. Most of the participants also were in the 30-39 age group (40 out of 89 participants, 44.94%), and a considerable percentage of the study population included nurses (36 out of 89 participants, 40.45%) and doctors (35 out of 89 participants, 39.33%). Most were also single (68 out of 89 participants, 76.40%).

Table 1. Profile of Pediatric Healthcare Workers in direct contact with patients suspected with COVID-19 infection at PCMC

Characteristics		Frequency (%)
Sex	Male	35 (39.33)
	Female	54 (60.67)
Age	20-29	39 (43.82)
	30-39	40 (44.94)
	40-49	3 (3.37)
	50-59	7 (6.74)
	60-69	1 (1.12)
Occupation	Medical Technologist	6 (6.74)
	Radiologic Technologist	12 (13.48)
	Nurse	36 (40.45)
	Doctor	35 (39.33)
Marital Status	Single	68 (76.40)
	Married	21 (23.60)

In Table 2 are the disaggregation of resilience score categories across the demographic variables. Most of the study participants have normal resilience across categories as measured from their BRS scores. From the breakdown of BRS score classifications per category of the demographic variables, females are more resilient with 36 (62.07%) participants having normal resilience and 7 (41.18%) people having high resilience. Among the age groups, those with ages 30-39 years old had the most normal resilience (25 out of 58, 43.11%) and high resilience (12 out of 17, 70.59%). According to occupation, nurses have the most persons with normal resilience (24 out of 58, 43.1%) and high resilience (9 out of 17, 52.94%). Majority of those who had normal resilience were single with 46 out of 58 persons (72.41%) and 13 out of 17 (76.47%) persons with normal resilience were also single.

Breaking down the results of the PSQI and BRS by the demographic variables, it is generally observed that PSQI was generally poor among all categories of the demographic variables, as the average PSQI per category which ranged from 5.00 to 7.60. Higher average PSQIs were seen in the male sex (7.09), age of 30-39 (7.6), were nurses(7.58), and were single(7.04). Of these average PSQIs, the average score of the category of those aged 30-39 had the highest average PSQI at 7.60 with a standard deviation of 3.68.

Table 2. Breakdown of results for each category based on their answers in the tools

Variables	Resilience, n (%)			
	Low	Normal	High	Ave PSQI (SD)
Sex				
Male	3 (21.43)	22 (37.93)	10 (58.82)	7.09 (4.69)
Female	11 (78.57)	36 (62.07)	7 (41.18)	6.83 (2.79)
Age				
20-29	10 (71.43)	24 (41.38)	5 (29.41)	6.59 (3.70)
30-39	3 (21.43)	25 (43.10)	12 (70.59)	7.60 (3.68)
40-49	---	3 (5.17)	---	6.33 (4.04)
50-59	1 (7.14)	5 (8.62)	---	5.33 (2.80)
60-69	---	1 (1.72)	---	5.00 (---)
Occupation				
Med.Tech.	1 (7.14)	5 (8.62)	---	5.17 (3.37)
Rad.Tech.	1 (7.14)	8 (13.79)	3 (17.65)	6.00 (4.77)
Nurse	3 (21.43)	24 (41.38)	9 (52.94)	7.58 (3.49)
Doctor	9 (64.29)	21 (36.21)	5 (29.41)	6.89 (3.36)
Marital Status				
Single	13 (92.86)	42 (72.41)	13 (76.47)	7.04 (3.51)
Married	1 (17.14)	16 (27.59)	4 (23.53)	6.57 (4.08)

Pearson correlation was run to determine the relationship between the PSQI and BRS scores of the study participants. The correlation coefficient was calculated at -0.338 with a p-value of 0.001, indicating that a significant, negative, but weak correlation exists between the two scores. This indicates that poor sleep quality (indicated by a high PSQI score) is associated with lower resilience (indicated by a lower BRS) in the context of the study population.

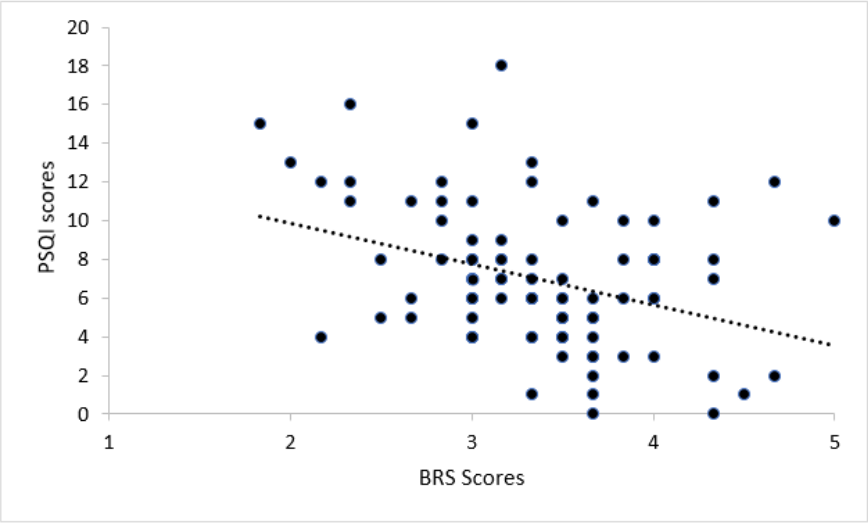

Figure. Pearson Correlation Coefficient of results showing linear correlation between BRS and PSQI scores.

Lastly, an analysis of variance (ANOVA) test was done to determine if there are any significant differences between the categorical variables which can affect sleep quality (measured by the PSQI) and resilience (measured by the BRS). From the F and p-values generated from the analysis, no statistically significant differences were found between groups for each category of the variables for which the test was run since all p-values were more than 0.05.

Table 3. Analysis of Variance (ANOVA) of factors which may affect sleep quality and resilience

Factors	BRS		PSQI	
	F	p-value	F	p-value
Age	2.123	0.085	1.161	0.334
Sex	0.001	0.971	0.763	0.385
Occupation	1.451	0.617	1.330	0.082
Marital Status	2.168	0.145	0.002	0.968

Discussion

Among the participants, there was predominance of females, aged 30-39 years old, nurses, who are single. These percentages are the same with the results of surveys in the world showing that more females are employed in the healthcare business.[12] According to Philippine data from 2019, there were more females aged less than 40 years old nurses in the healthcare profession industry which is parallel with the results of this paper.[13] The marital status predominant which is single, may be because majority of the participants are on the younger side. Also, there has been an increase in the number of healthcare professionals seeking higher paying jobs abroad.[14] The older nurses may have already migrated to a different country and may contribute to the reason there are younger participants in this study.

Resilience has been a topic of focus for healthcare workers during the COVID-19 pandemic. A systematic review of evidence has found that there are factors that affect resilience among healthcare workers, particularly work engagement, social support, and anxiety or depression [15]. The study also found moderate resilience scores for healthcare workers around the world, which was also validated through the findings of this study. Normal resilience score was the majority in the study participants. The same results of normal resilience were seen in the data from the predominantly female, single, aged 30-39 nurses which may also be because they were also most of the participants.

Resilience can also depend on social resources to thrive under different circumstances. Therefore, a study coined the term “national resilience” to note that resilience can also occur as a collective effort or a country-wide phenomenon [16]. In this study which measured and determined the antecedents of national resilience in Filipino adults during the COVID-19 pandemic, older age, religious beliefs, and holding a more right-wing political attitude tend to have a higher level of perceived national resilience, for the following reasons: (1) older individuals had many experiences which allowed them to have greater confidence in the capacity of the nation to recover amid crisis; (2) religion is a stronghold that Filipinos consider especially during times of personal or collective crisis; and (3) having a more conservative political view can make one more responsive and attuned to negative stimuli. [17] Generally, Filipinos are among the most resilient healthcare workers which may be due to cultural

[17] Generally, Filipinos are among the most resilient healthcare workers which may be due to cultural, social and based on political and religious beliefs which may be the reason why there is a predominance of participants with normal to high level of resilience in this study. A higher level of national resilience is strongly linked to lesser psychological distress in the country's population [17], and it is for this reason that coping strategies to boost the resilience not only of healthcare workers but of the totality of the national population can be considered by policymakers.

Preserving the resilience of healthcare workers especially during times of distress such as the COVID-19 pandemic should be highly considered in health, safety, and wellness programs in healthcare facilities. An abundance of studies emphasized the need for healthcare worker leaders to recognize that these workers need to be more widely understood and that restricting organizational resilience can lead to adverse patient safety impacts and worsen staff retention [18]. A study recommended strategies for supporting the mental well-being and resilience of healthcare workers especially during distressing times such as the COVID-19 pandemic [19], including the development of a modern-day hierarchy of needs to primarily support the physical and psychological needs of the healthcare workers before finally addressing and supporting patient and community needs, allowing healthcare workers to seek psychological help without stigma or repercussion, development of individualized emotional support plans, limiting shift work, and the implementation of training and education strategies on mental health awareness in healthcare facilities.

The study findings also demonstrated how sleep quality can be a factor which can be independently associated with resilience in the healthcare worker population. In healthcare workers, a generally poor quality of sleep can be observed as they also work in shifts, which disrupts the normal circadian rhythm. In fact, a study on the impact of shift work on sleep quality among healthcare workers mentioned that working during consecutive night shifts, consecutive day shifts, and between evening and day shifts led to more restricted sleep schedules [20], consequently adversely affecting their sleep quality.

Working during the COVID-19 pandemic is also shown to have a negative impact on sleep quality of healthcare workers, as mentioned in several studies which also used the PSQI for their scoring tool. In these studies, poor sleep quality was also found to be positively correlated with anxiety [21, 22] and a higher risk of developing anxiety-related symptoms [23, 24]. These studies explain that reasons for poor sleep quality among healthcare workers during the pandemic can be attributed to post-traumatic stress disorder (PTSD), depression, anxiety, high workload, and stress-induced sleep problems, which has been the common experience of all healthcare workers in caring for COVID-19 patients as collectively mentioned by these studies.

We showed that poor sleep quality is also associated with poor resilience. This is further proven by the results of the Pearson coefficient run using the data collected which revealed that a negative but weak correlation exists between the two scores used to evaluate each participant. Moreover, regardless of the demographic characteristics, sleep quality is still poor in the healthcare worker population.

Based on the results of the analysis of variance done, there was no statistically significant differences found between groups for each category of the variables and the resilience of a healthcare worker.

Conclusion

This study was a single-center cross-sectional study which revealed that there is a predominance of females, age of 30-39, and the nurse and doctor occupations were observed. Normal resilience was also reported in majority of the healthcare workers. All the study participants had poor sleep quality as determined in the overall average PSQI score. A negative correlation between resilience (as measured by the BRS) and sleep quality (based on PSQI scores) was observed, which denotes that poor sleep quality can be associated with lower resilience, and vice versa. However, temporality cannot be assumed in this study.

Healthcare program planners can consider the addition of coping strategies as well as training and education strategies on increasing the resilience of healthcare workers, since more resilient workers are better equipped in delivering the optimal quality of healthcare services to their patients. Improving sleep quality among the workers in this study population is also recommended for the hospital management, to consider limiting shift work hours, and developing more equitable work rotation schedules so that they can compensate for the high restriction in their sleep schedules.

Future studies can expand by doing the same objectives in healthcare workers in different settings, to better see the dynamicity of resilience as a multi-faceted phenomenon, and how sleep quality can be affected by different environmental and socio-demographic conditions. A multi-center study may also be done to increase the number of participants and possibly apply stratification of the samples. A different study design of a larger scale may also be employed to be able to establish temporality between resilience and sleep disturbance.

A limitation of this study is the lack of randomized sampling. In using purposive sampling, the researcher was only able to interview subjects who were on duty at a specific time that was convenient for the interviewer to perform data collection. Because the researcher did not meet the sample size, stratification of the participant's answers was not possible. Enlarging the scope of this paper to a multi -center study might help. This paper, likewise, is unable to remove the factor of the nature of the work – with all the participants going on night duties which may cause sleep disturbance all on its own. Another limitation is that the research design cannot establish temporality between sleep disturbances and resilience in healthcare workers. This may be a recommendation for another possible research topic.

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