The relationship between mental workload and nurse stress levels in hospitals

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Abstract

High mental workload implies significant mental resources and can lead to increased cognitive stress and fatigue. Nurses have the responsibility of managing a wide range of nursing care tasks, awhich frequently involve addressing anxiety, handling patient complaints, and managing patient defense mechanisms, all of which can lead to increased stress levels. This study aimed to identify the relationship between mental workload and the stress level of nurses in the Hospital Malang City. The research utilized a cross-sectional study design. The sampling technique employed was Total Sampling, involving 96 inpatient nurses at the hospital. Data collection involved the use of two questionnaires: the National Aeronautics and Space Administration Task Load Index (NASA-TLX) and the Perceived Stress Scale (PSS-10). Data analysis in this study was conducted using Pearson Correlation. The results indicated a positive relationship between mental workload and nurses' stress levels, supported by a significant p-value of 0.002 and a correlation coefficient of 0.312. A high mental workload can impact the level of job-related stress experienced by nurses. Effective stress management skills can help individuals mitigate this impact.

Introduction

Job stress is a serious problem faced by nurses in carrying out their professional duties.[1,2] High levels of stress in nurses' jobs can negatively impact their well-being as well as the quality of care provided to patients.[3–5] Several studies have been conducted to understand the impact and factors associated with the work stress of nurses.[6–8] Nursing workload is all activities or activities carried out by nurses during their duties in a nursing service unit. Workload includes both physical and mental workload.[9] Mental workload is the difference between the workload and the maximum capacity of a person's mental load.[10,11] Nurses must be responsible for physical, administrative, and comprehensive nursing care tasks such as dealing with anxiety, complaints, and patient defense mechanisms resulting in stress levels.[12,13]

The level of mental stress among nurses indicates that they often operate in highly demanding work environments. Several factors can influence their workload and self-esteem. Nurses who share living spaces, have fewer years of work experience, possess younger professional qualifications, earn lower incomes, hold non-management positions, exhibit lower psychological capital, and adopt negative coping styles are more likely to experience low workload and low self-esteem. Conversely, higher psychological capital and positive coping styles tend to be associated with medium and high workloads and high self-esteem.[14] The issue of burnout is prevalent in Europe, with health and social service workers (nurses) experiencing 43% of cases, teachers experiencing 32%, and the rest distributed among administrative and management professionals, as well as those in the legal and policy sectors.[15] An imbalance in mental workload, where certain tasks or cognitive demands are disproportionately higher than others, can result in various negative consequences, including stress and burnout, reduced performance, decreased job satisfaction, physi-

cal health problems, interpersonal issues, diminished creativity and innovation, and increased turnover.[16]

Nurses regularly experience a variety of work-related stressors, including long hours, time constraints, meeting patient needs, irregular schedules, and a lack of professional support.[17–20] These demanding job conditions can profoundly affect the mental health and overall quality of life of healthcare professionals.[21–23] Previous research has shown that the constant stress these professionals experience can have a negative impact on their psychological well-being.[24,25] Poor mental health among healthcare providers can compromise their professional effectiveness and significantly impact the quality of care they offer to patients, ultimately negatively influencing patient health.[17,24,26] Therefore, nursing leaders and managers are increasingly interested in the health status of nurses.

The negative impact that will arise from the increased workload is that the nurses' emotions will arise which are not controlled and are not what the patient expects.[27] If the stress experienced by nurses is too great, it will have an impact on performance which begins to decline, because it can hinder nurse performance.[28] In addition, nurses will lose the ability to control it or be unable to make decisions in their work and their behavior becomes erratic. The most extreme impact that may occur to nurses and the services provided is performance becomes zero, nurses experience distraction, become sick, and are no longer strong enough to work, become hopeless, leave or refuse to work.[28] Hospital and care administrators should identify specific workload and teamwork issues and provide solutions to reduce the psychological burden on caregivers.[29]

This study aimed to determine the relationship between mental workload and stress levels experienced by nurses, by analyzing workload and work stress, it will be able to improve the quality and quantity of health services. In addition, it can increase effectiveness in the provision of nursing care.

Materials and Methods

Study design

The design of this study was correlation study with a Cross Sectional Study approach. The research was conducted on December 15 to December 29, 2022.

Sample and settings

The population of this study were inpatient nurses at Hospital Malang City. The research sample was all inpatient nurses at Hospital Malang City with a total of 96 respondents using a total sampling technique. The inclusion criteria for respondents were as follows: the nurse currently works at Hospital Malang City; the nurse has a minimum education level of a diploma (DIII) in nursing; the nurse has at least 1 year or more of work experience in hospital nursing; and the nurse falls within the age range of 21-60 years.

Variables and instruments

The independent variable is mental workload as measured by the National Aeronautics and Space Administration Task Load Index (NASA-TLX) questionnaire. There are 6 main indicators, namely Mental demand (MD), Physical demand (PD), Temporal demand (TD), Performance (P), Frustration level (FR).[30] This minimum and maximum value is 0-100 with the categories Mild (0-29), Moderate (30-49), Severe (50-79), Very Severe (80-100).[31]

The dependent variable of this study is the stress level measured by the PSS 10 (Perceived Stress Scale) questionnaire. There are 10 questions with mild category values (1-14), moderate (15-26), and severe (> 26).[32]

The instrument in this study used a questionnaire with the Perceived Stress Scale 10 (PSS 10) method. PSS 10 is the only empirically established general stress assessment index. For each question, must choose from the following alternatives: 0 = never, 1 = almost never, 2 = sometimes, 3 = quite often, 4 = very often. Then, the scores are added for each item to get a total score. The total score is represented as a stress score. Individual scores on PSS 10 can range from 0 to 40, which are grouped into 3 groups. The independent variable is mental workload as measured by the National Aeronautics and Space Administration Task Load Index (NASA-TLX) questionnaire. The dependent variable of this study is the stress level measured by the PSS 10 (Perceived Stress Scale) questionnaire.

Data collection

Primary data was collected using a prepared questionnaire. Before the questionnaires were distributed to be filled in by respondents, the researcher explained the procedures for filling out the questionnaires to the nurses. This is so that when filling out the questionnaire nothing is missed and no one experiences misunderstandings. Secondary data was obtained from recording and reporting from hospital management. The data is in the form of: the number of inpatient room nurses, nurse absences, and the number of inpatient room patients. Data collection was carried out offline by distributing questionnaires. Data were analyzed using SPSS software (Statistical Package for Social Science) version 25. Data analysis used the Pearson correlation test. Data were analyzed using the Pearson correlation test with a significance level <0.05.

Data analysis

Univariate analysis in this study was mental workload and stress level. The bivariate test uses the Pearson Correlation test to determine the level or closeness of the relationship between two variables on an interval or ratio scale under normal distribution conditions with significant value < 0.05.

Ethical clearance

The research has received ethical approval from the Health Research Ethics Commission, Faculty of Medicine, University of Muhammadiyah Malang, based on ethical certificate E.5.a/216/KEPK-UMM/XI/2022. During the research, the researcher pays attention to the ethical principles of information to consent, respect for human rights, beneficence, and non-maleficence.

Results

Data collection in this research was carried out by distributing questionnaires directly. The data presented in the questionnaire consists of the respondent's personal data and questions related to the mental workload and stress experienced by the respondent.

A description of the characteristics of respondents in Table 1 based on age was obtained by 53 respondents or 55.2% who were aged 26-35 years. The description of the characteristics of respondents based on gender was obtained by 77 respondents or 80.2 percent who were female. A description of the characteristics of respondents based on the type of room obtained by 51 respondents or 53.1% working in different types of ward rooms from the pediatric ward, surgical ward, and internal medicine ward. The descrip-

tion of the characteristics of the respondents based on the length of working hours was obtained by 63 respondents or 65.6% who worked for 7 hours. Description of the characteristics of respondents based on the level of patient dependence obtained 62 respondents or 64.6% of patients have a partial level of patient dependence. Description of the characteristics of respondents based on years of service obtained 41 respondents or 42.7% have worked for 1-5 years. Description of the characteristics of respondents based on the number of patients handled in 1 day obtained 67 respondents or 69.8% treated > 15 patients in a day.

Based on Table 2, nurses with an average score of Mental Needs 182.5, Physical Needs 155.9, Time Needs 151.6, Performance 163.1, Effort Level 168.0, Frustration Level 97.8. It can be concluded that inpatient nurses have greater mental needs compared to other indicators. The description of mental workload from 96 respondents obtained 3 people or 3.1% had light mental workload, 22 people or 22.9% had moderate mental workload, 58 people or 60.4% had heavy mental workload, and 13 people or 13.5% have a very heavy mental workload.

Based on the results of the study, it was found that the average value for negative statements was 8.56 and the average value for positive statements was 9.35, similar to the results of the study, namely that inpatient nurses experienced moderate work stress with the results of 72 respondents or 75 %. The description of work stress from 96 respondents obtained 22 people or 22.9% had light work stress, 72 people or 75.0% had moderate work stress, and 2 people or 2.1% had heavy work stress (Table 3).

Pearson correlation test results between mental workload and work stress obtained a correlation coefficient of 0.312 with a significance value of 0.002. These results show a significance value of less than 0.05 (sig <0.05) so that it is stated that there is a significant positive correlation between mental workload and work stress, meaning that the heavier the mental workload of nurses will have a significant effect on the heavier the work stress of nurses, and conversely, the lighter the mental workload of the nurse will have a significant effect on the lighter the nurse's work stress. The strength of the correlation was measured using the correlation coefficient obtained at 0.312, where these results indicate that the strength of the correlation between mental workload and work stress is at a low level (Table 4).

Discussion

The age characteristics of nurses who experience very heavy mental workload, it is dominated by nurses who are 26-35 years old, as many as 8 respondents. This is closely related to the maturity or maturity level of a person.[33] The older a person is, the more

mature he will be, the maturity of his soul and more capable of carrying out his duties and responsibilities.[34] As you get older, your ability to make decisions, think rationally, be wiser, be able to control your emotions, be more tolerant, and be open to the views or opinions of others will increase so that your stress resistance will increase.[35]

Individuals who have longer work experience tend to be more resistant to the pressures experienced in work, than individuals with shorter working tenure because they have less experience.

Table 1. Data on respondent characteristics.

Characteristics	n	%
Ages		
<25 years old	35	36.5
26-35 years old	53	55.2
36-45 years old	5	5.2
>45 years old	3	3.1
Sex		
Female	77	80.2
Male	19	19.8
Room		
Surgical	4	4.2
Medical	7	7.3
Pediatric	8	8.3
Surgical, Medical	4	4.2
Medical, Pediatric	2	2.1
Surgical, Medical, Pediatric	20	20.8
Others	51	53.1
Work durations		
<7 hours	4	4.2
7 hours	63	65.6
>7 hours	29	30.2
Patient dependency level		
Minimal	25	26.0
Partial	62	64.6
Total care	9	9.4
Working period		
<1 years	16	16.7
1-5 years	41	42.7
5-10 years	25	26.0
>10 years	14	14.6
Number of patients in 1 day		
5-10 patients	3	3.1
10-15 patients	26	27.1
>15 patients	67	69.8
Total	96	100

Table 2. Description of mental workload.

	KM (mental needs)	KF (physical needs)	Statistics KW (time needs)	P (Performance)	TU (effort level)	TF (frustration level)
N	96	96	96	96	96	96
Mean	182.5	155.9	151.6	163.1	168.0	97.8
Median	180.0	150.0	150.0	150.0	150.0	40.0
St. deviation	99.2	109.5	83.4	119.5	114.6	114.2
Minimum	0	0	0	0	0	0
Maximum	500	450	400	450	450	400

Tenure of work is related to the experience of a worker in dealing with problems at work.[36] Nurses with a tenure of <10 years usually have more work problems than nurses with a tenure of >10 years. Another factor affecting mental workload is the patient-to-nurse ratio, namely the large number of patients that must be handled by nurses. When the number of nurses and the number of patients to be treated is not balanced, it will cause something called mental workload. The results of the research show that inpatient nurses at Hospital Malang City mostly manage >15 patients per day per individual.

Based on the results of the study, it was found that inpatient nurses experienced moderate work stress. Job stress is a form of a person's response, both physically and mentally, to a change in his environment that is felt to be disturbing and causes him to be threatened.[37] The main factors that cause job stress are intrinsic, work, demands from outside the organization/work, limited time to do work, frustration, changes in job types, and individual characteristics such as personality, skills, values and needs, years of service, age, and education.[38]

Humans are instinctively born as individuals who always try to adapt to the changes that occur. Similarly, with high levels of stress, the more diverse ways of coping with stress are developing. Efforts to overcome stress are theoretically termed stress management.[39] Stress management is a series of programs to control and regulate stress which aims to identify the causes of stress and know techniques for managing stress so that people are better at handling stress in life. One of the factors that health workers have in stress resilience is self-motivation, the high level of workload felt by the workforce requires them to adapt to the circumstances that occur, encouraging the workforce to adapt to overcome the stress they experience due to demands.[40] In line with the results of the study, the adaptation of a good nurse will minimize the incidence of heavy work stress, even though in the research results, inpatient nurses at Hospital Malang City have a heavy mental workload, inpatient nurses at Hospital Malang City can manage to stress well so that the level of stress experienced by nurses still at medium level.

The results of the correlation test showed a significance value of p=0.002 (sig < 0.05) so it was stated that there was a significant positive correlation between mental workload and work stress, meaning that the heavier the mental workload of nurses would have a significant effect on the heavier the work stress of nurses, and vice versa the lighter the mental workload of the nurse will have a significant effect on the lighter the work stress of the nurse. The strength of the correlation was measured using the correlation coefficient obtained at 0.312, where these results indicate that the strength of the correlation between mental workload and work stress is at a low level.

This level indicates that stress can occur, one of which is influenced by the way individuals respond to pressure obtained at work.[41] Individuals who can control external pressure well can avoid stress. Mental workload is not the only thing that can affect work stress, another thing in the form of individual differences is associated with an individual's ability to handle stress because there are individuals who can handle stress well, while others feel overwhelmed due to stress. Individual difference factors consist of perception, work experience, social support, and personality.[42]

This is similar to the results of a study that showed that most of the inpatient nurses at Hospital Malang City experienced a heavy mental workload, but most only had moderate levels of work stress. Inpatient nurses at Hospital Malang City are dominated by nurses who have worked for 1-5 years and nurses aged 26-35 years, this can help nurses handle stress well so that the level of work stress that appears is only at a moderate level.

This study has several limitations, In this study, researchers were unable to examine directly respondents because the Head of the Nursing Department at Aisyyah Islamic Hospital gave access only to entrust the questionnaire sheets to each Head of Room. This research was carried out only in 1 installation, namely the inpatient installation, it was not carried out in other installations such as the emergency unit or Intensive Care Unit. Moreover, the researcher also did not examine further other factors related to the respondent's mental workload, for example the distance between the place of residence and the work location and other work performed by nurses outside the hospital, causing limitations in discussing the results of the study.

Conclusions

In conclusion, this study highlights the significant impact of mental workload on the stress levels of nurses working in a demanding hospital environment. The positive relationship observed underscores the importance of recognizing and addressing mental workload as a crucial factor in understanding and managing work-related stress among nurses. This study emphasize the need for healthcare institutions to prioritize strategies and interven-

Table 3. Description of stress levels.

	Favorable	Unfavorable
N	96	96
Mean	8.56	9.35
Median	9.00	9.00
St. deviation	4.384	2.726
Minimum	0	4
Maximum	19	16

Table 4. Pearson correlation test results.

		Mental Workload	Stress levels
Mental Workload	Pearson Correlation	1	.312**
	Sig. (2-tailed)		.002
	N	96	96
Stress levels	Pearson Correlation	.312**	1
	Sig. (2-tailed)	.002	
	N	96	96

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tions that reduce mental workload among nurses. Providing tools, resources, and training to help nurses effectively manage their workload can contribute to a less stressful work environment, ultimately enhancing the well-being of nurses and the quality of patient care.

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