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DOES MENTAL WORKLOAD AFFECT MISSED NURSING CARE IN NURSES? A CROSS-SECTIONAL AND CORRELATIONAL STUDY

Nazlıhan EFE SAYAN¹  Hande DEMİRTAŞ²  Serap ALTUNTAŞ³ 

¹Bandırma Onyedi Eylül University Institute of Health Sciences, Bandırma/Balıkesir, Türkiye

²Bandırma Training and Research Hospital, Bandırma/Balıkesir, Türkiye

³Bandırma Onyedi Eylül University Faculty of Health Sciences, Bandırma/Balıkesir, Türkiye

*Corresponding Author: nazlihann@gmail.com

Abstract: This cross-sectional and correlational study was conducted to determine the effect of mental workload of nurses on missed nursing care. The study was conducted with 93 volunteer nurses working in a training and research hospital. Descriptive information form, mental workload scale, missed nursing care needs scale were used for data collection. In this study, it was found that the mean mental workload scores of nurses were high and the mean missed nursing care scores were low. It was determined that there was no significant relationship between temporary workload, emotional workload, performance-related workload and total mental workload of nurses and the amount and causes of missed nursing care needs ($p > 0.05$), and there was no significant relationship between cognitive workload and the causes of missed nursing care needs ($r = -.105$, $p = .318$), but there was a negative, significant and very weak relationship with the amount of missed nursing care needs ($r = -.226$, $p = .029$). It was also found that cognitive workload explained 5.1% of the amount of missed nursing care needs in nurses. As a result of this study, it was revealed that temporary, emotional, performance-related and total mental workload did not affect the amount and causes of missed nursing care needs in nurses, while cognitive workload only reduced the amount of missed nursing care needs. According to these results, in order to reduce the mental workload of nurses, more nurses should be employed in health institutions and other undesirable organizational outcomes such as possible exhaustion, job dissatisfaction, fatigue, etc. should be prevented.

Keywords: Nursing, Nurse, Mental Workload, Missed Nursing Care

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1. Introduction

Workload, which is one of the basic building blocks of business life, is the amount of tasks or work that an individual must fulfill within the defined working time related to his/her organizational role. As the amount, difficulty and complexity of the tasks/jobs performed by the individual increase, the workload increases accordingly. Workload, which was first expressed only as the amount of physical effort required to perform the job, is defined as a process that physically and mentally exhausts the employee, negatively affects his/her social life, performance, health status, may cause focusing problems, and ultimately causes effects such as making mistakes, decreasing productivity and efficiency [1]. Mental workload, which is one of the types of workload, is the cognitive effort that occurs during the fulfillment of the employee's duties and covers all activities related to the mind such as calculation, decision-making, keeping in mind, searching, research, communication, decision-making, information

production, information processing, and thinking [2]. "Mental workload threatens not only individual health but also organizational outcomes, including productivity, motivation, and job performance." It increases the time to complete the task and the rate of making mistakes [2].

In health services, nurses play an important role in achieving organizational outputs such as quality and efficiency. Especially in recent years, interest in the mental workload of nurses has increased as well as their physical workload. It has even been emphasized that mental workload is an important issue that should be of concern for nurse managers in the nursing work environment, especially in some developing countries. Nursing is a profession that requires high attention, decision-making, and multitasking management. Mental workload is defined as the pressure on the cognitive capacities of nurses and this load increases as the complexity of the work environment increases. Nurses work in dynamic environments where they have to respond to constantly changing patient situations. In this process, mental workload can affect the nurse's attention, decision-making process and overall performance [3]. Increasing mental workload increases the stress level of nurses and increases the risk of burnout [4]. Inadequate staff [5], complexity of information systems [6], jobs that require constant attention and multiple tasks [7] are stated as factors that increase mental workload in nurses. [8]. In many studies, it has been revealed that the mental workload of nurses is high [8,9,10] and individual, organizational and psychosocial factors that increase or affect mental workload have been revealed in some studies conducted in different parts of the world [8,11,12]. Previous studies have found a significant association between nurses' physical workload and their mental workload. [13] mental workload increases stress levels [14], decreases attention sensitivity of nurses [15] and the effects of mental workload on nurses' performance [16] musculoskeletal disorders and intention to leave service [10] have been investigated. The high mental workload makes it difficult for nurses to perform their duties on time and correctly, leading to an increase in error rates [17]. On the other hand, mental fatigue and constant stress can lead to emotional exhaustion and turnover intention in nurses [18]. At the same time, high mental workload causes consequences that directly affect patient safety such as medication errors, patient falls and communication breakdowns [19]. It has been found that high mental workload may cause nurses to work in a stressful environment and may lead to missed nursing care by reducing their performance and efficiency with decreased attention levels [20]. As a result, mental workload of nurses appears as an important concept missed nursing care.

"Missed nursing care" is defined as neglecting, postponing or not providing some or all of the nursing care required by patients for various reasons [21]. Missed nursing care was first defined by Kalisch [22] and has become an important indicator in assessing the quality of nursing services. Studies show that missing nursing care directly affects patient outcomes and reduces the quality of nursing practice [23]. This includes basic care practices such as personal hygiene, nutrition, mobilisation, pressure sore prevention, drug administration and patient education. The most common cause of missing nursing care is insufficient number of nurses [24]. In addition, time pressure, lack of equipment and communication problems also negatively affect the process [25]. On the other hand, deficiencies in the organisational structure affect missing care. For example, failure to distribute tasks in accordance with the number of patients may lead to some care tasks being ignored [26]. In studies, the most common reasons for missed nursing care are insufficient number of staff, insufficient number of auxiliary and technical staff, an unexpected increase in the number of patients or density in the unit, emergency patient situation, and inappropriate operation of materials/devices when necessary [27,28,29,30,31,32,33]. Although all these reasons are factors that actually increase both physical and mental workload of nurses, it is thought that they will negatively affect mental workload of nurses and may increase missed nursing care even more. The effect of individual workload [18] or general workload [19] on missed nursing care in nurses has been examined. There are studies on workload and missing care, but no study was found on the effect of mental workload on missing care. In a study conducted by Ball et al. [23], it was observed

that the rate of missed nursing care increased in nurses experiencing workload. Similarly, Kalisch and Williams [26] reported that workload can disrupt critical functions of nurses such as patient monitoring and reporting. In this study, when the extent to which mental workload affects missing care is determined, it may shed light on managers in terms of improvement studies to be carried out by taking mental demands into consideration. This gap in the literature prompted the current investigation and this study was conducted to determine the effect of the mental workload of nurses on missed nursing care. This study is important in terms of revealing the effect of mental workload on missing nursing care. It has been suggested that the results of this study, which is important as one of the first studies on the subject, will fill this gap in the literature and guide researchers in planning future studies, and will be useful in making the necessary planning by providing important data to managers in making the necessary interventions related to nurses.

2. Materials and Methods

2.1. Study Design and Participants

This study is a correlational and cross-sectional study. The population of the study consisted of 110 nurses working in inpatient units (physical therapy, neurology, palliative, stroke, chest, internal medicine, cardiology, pediatrics, gynecology, general surgery, urology, orthopedics, neurosurgery, cardiovascular surgery, psychiatry, etc.) of a training and research hospital and taking part in direct patient care. The sample size was calculated according to a prevalence rate of 78.6% with a 5% margin of error and a 95% confidence level [34]. Taking a non-response rate of 5%, the total sample size was calculated as 86. The sample consisted of 93 volunteer nurses who worked as clinical nurses in these units, were open to communication and co-operation, and agreed to participate in the study. Working as a charge nurse in these clinics is an exclusion criterion for the study. The rate of participation in the study was 84.5%.

2.2. Assessment Instruments

A questionnaire form including a descriptive information form, mental workload scale, and missed nursing care needs scale was used to collect the data.

Descriptive Information Form: It consists of 6 questions to determine the characteristics of nurses such as gender, marital status, education, age, professional experience, corporate experience.

Mental Workload (CarMen-Q) Scale: The CarMen-Q scale developed by Rubio-Valdehita et al. [20] to measure mental workload was adapted into Turkish by Yavuz et al. [1]. Consisting of 25 items, the scale is answered in 5-point Likert type (1 point: Strongly disagree - 5 points: Strongly agree). The scale consists of 4 sub-dimensions (Cognitive Workload- 9 items, Temporary Workload- 4 items, Emotional Workload- 7 items and Performance Related Workload- 5 items). The Cognitive Workload dimension is related to the attention required for the job, processing complex information and decision-making, while the Temporary Workload dimension represents the pace of work and the speed demanded for the job. The Emotional Workload dimension measures the degree to which work causes stress on the employee as well as making him/her irritable and anxious. The Performance Related Workload dimension is related to the performance requirements and the level of responsibility of the job. The Cronbach's α reliability coefficients of the scale are 0.89, 0.91, 0.92 and 0.93 in the sub-dimensions, respectively, and 0.90 in total. In this study, Cronbach's α reliability coefficients were 0.57, 0.64, 0.81, 0.89 and 0.82 in total. There were no reverse scored items in the scale. The scale is evaluated based on the mean scores of the sub-dimensions, and an increase in the mean score indicates an increase in the mental workload in that sub-dimension.

Missed Nursing Care Needs Scale (MISSCARE Survey-Turkish): The scale was developed by Kalisch and Williams in 2009 to determine nurses' views on the amount and causes of missed nursing

care needs and was adapted into Turkish by Kalisch, Terzioğlu, and Duygulu [16]. The first part of the scale, which consists of two parts, is intended to determine the amount of missed care needs by nurses and consists of 21 items and is scored on a five-point Likert scale (1: Rarely not given, 2: Sometimes not given, 3: Often not given, 4: Never given, 5: Not appropriate). The second part is aimed at determining the reasons for missed care needs and consists of 16 items and 3 sub-dimensions and is scored on a four-point Likert scale (Major reason-1, Moderate reason-2, Minor reason-3, Not a reason for not providing care-4). The second part consists of three dimensions: labor resources (4 items), material resources (3 items) and communication (9 items). There are no reverse scored items in the scale. In the first part of the scale, the higher the score, the higher the amount of missed nursing care needs, and in the second part, the lower the sub-dimension score, the higher the importance of the reason for missed nursing care. The average score for each subscale is calculated by summing the responses given by each participant for each subscale. The average score is obtained by dividing the total score by the number of items.

The Cronbach α value of the first part of the scale was found to be .93 and the Cronbach α value of the second part was found to be .80 [16]. In this study, the Cronbach α values of the first and second parts of the scale were found to be 0.90 and 0.90.

2.3. Ethical Consideration

Before starting the research, ethical approval was obtained from the ethics committee of the Bandırma Onyedi Eylül University (Date: 06.01.2024 Number: 2023-272) and institutional permission (Date: 16.02.2024) was obtained from the institution where the research was conducted. Necessary permissions were obtained from the relevant authors for the use of the scales, and the participants were given the necessary explanations in line with the informed consent form and the volunteers were allowed to fill out the questionnaire form. The research process was conducted in accordance with the Declaration of Helsinki.

2.4. Data Collection and Analysis

The research data were collected face-to-face from the participants between February and April 2024. In the collection of research data, the units included in the study were visited one by one and the nurses were informed about the research and invited to the research. Of the 110 nurses working in the units included in the study, 93 participated voluntarily and answered the questionnaire form completely.

The data were transferred to the computer environment by the researchers and evaluated by means of the Statistical Package for the Social Sciences 22.0. Cronbach's Alpha coefficient, descriptive statistics, percentage and frequency distributions, Pearson Correlation Analysis, Simple Linear Regression Analysis tests were used in the evaluation of the data. In the regression analysis, the dependent variable is missing nursing care and the independent variable is mental workload. The data were transferred to the computer environment by the researchers and evaluated by means of statistical package programs. Parametric tests were used in the analysis because the data showed a normal distribution. Cronbach's Alpha coefficient, descriptive statistics, percentage and frequency distributions, Pearson Correlation Analysis, and Simple Linear Regression Analysis tests were used in the evaluation of the data.

3. Results

As a result of the evaluation of the research data, it was determined that the majority of the nurses who participated in the study were female (92.5%), married (77.4%), undergraduate or graduate graduates (81.7%), between the ages of 24-30 years (40.9%), with 10 years or less professional experience (53.8%) and 5 years or less institutional experience (60.2%) (Table 1).

Table 1. Descriptive characteristics of participants (n=93)

Descriptive Characteristics		n	%
Gender	Female	86	92.5
	Male	7	7.5
Marital Status	Married	72	77.4
	Single	21	22.6
Education (degree)	Associate Degree	17	18.3
	Undergraduate/Graduate	76	81.7
Age (year)	24-30 years	38	40.9
	31-40 years	28	30.1
	>41 years	27	29.0
Professional Experience	1-5 years	24	25.8
	6-10 years	26	28.0
	11-15 years	12	12.9
	16-20 years	15	16.1
	>21	16	17.2
Corporate experience	≤ 5	56	60.2
	>5	37	39.8

**The reason for grouping categorical variables in the ranges shown is to ensure equal distribution of the groups [35].

When the mental workloads of the nurses were evaluated, it was found that the mean score of the performance-related workload sub-dimension was ($M=4.76\pm.56$), the mean score of the cognitive workload sub-dimension was ($M=4.10\pm.96$), the mean score of the emotional workload sub-dimension was ($M=3.91\pm.94$), the mean score of the temporary workload sub-dimension was ($M=3.44\pm.64$) and the mean score of the total mental workload was ($M=4.05\pm.58$) (Table 2).

In terms of the reasons why nurses missed their nursing care needs, the mean score for the amount of missed nursing care needs was found to be ($M=1.52 \pm .50$), the mean score for the workforce resources sub-dimension ($M=1.33 \pm .55$), the mean score for the financial resources sub-dimension ($M=1.94 \pm .89$) and the mean score for the communication sub-dimension ($M=1.81 \pm .69$) (Table 2).

Table 2. Mean scores of the mental workload scale and the missed nursing care scale of nurses

Scale	Subcales	n	Min.	Max.	Mean	SD
Mental Workload Scale	Cognitive Workload	93	1.50	9.90	4.10	.96
	Temporary Workload	93	1.86	4.86	3.44	.64
	Emotional Workload	93	1.00	5.00	3.91	.94
	Performance Based Workload	93	1.40	5.00	4.76	.56
	Total	93	1.53	5.94	4.05	.58
Missed Nursing Care Needs Scale	Amount of Missed Nursing Care Needs	93	1.00	3.48	1.52	.50
	Reasons for Missed Nursing Care Needs					
	Labor Resources	93	1.00	3.67	1.33	.55
	Material Sources	93	1.00	5.00	1.94	.89
	Contact	93	1.00	5.00	1.81	.69

Table 3. Correlation analysis results for the relationship between mental workload and missed nursing care needs of nurses

		Amount of Missed Nursing Care Needs	Reasons for Missed Nursing Care Needs	Labor Resources	Material Sources	Contact
Mental Workload Scale	r	-.124	-.094	-.151	-.054	-.022
	p	.237	.368	.149	.605	.833
Cognitive Workload	r	-.226	-.105	-.173	-.086	-.005
	p	.029*	.318	.098	.414	.962
Temporary Workload	r	-.139	-.081	-.131	-.126	.030
	p	.183	.439	.212	.230	.774
Emotional Workload	r	-.017	-.105	-.162	.035	-.088
	p	.874	.315	.120	.736	.399
Performance Based Workload	r	.062	.060	.095	.006	.032
	p	.553	.570	.364	.954	.763

*p<0.05

When the relationship between nurses' mental workload and missed nursing care needs was examined, it was determined that there was no statistically significant relationship ($p>0.05$) between temporary workload, emotional workload, performance-related workload and total mental workload and the amount and causes of missed nursing care needs. While there was no statistically significant relationship between cognitive workload and the reasons for missed nursing care needs ($r = -.105$, $p = .318$), there was a negative, statistically significant and very weak relationship between the amount of missed nursing care needs ($r = -.226$, $p = .029$) (Table 3).

Table 4. Regression analysis results for the predictive status of nurses' cognitive workload on the amount of missed nursing care needs

	Unstandardized coefficients		Standardize has been coefficients				
	B	Std. error	β	t	p	F	R ²
Fixed	2.469	.308		8.023	.000		
Cognitive Workload	-.162	.073	-.226	-2.213	.029	4.892*	.051

Dependent variable: Amount of missed nursing care needs

*p<0.05

When the predictive status of nurses' cognitive workload on the amount of missed nursing care needs was examined, it was determined that the model created was statistically significant and that cognitive workload explained 5.1% of the variance of the amount of missed nursing care needs ($R^2 = .051$; $F(1,91) = 4.892$, $p < 0.05$). According to the results obtained, cognitive workload predicted the variance of the amount of missed nursing care needs in a statistically significant and negative direction ($\beta = -0.226$, $t = -2.213$, $p < 0.05$). In other words, it was determined that nurses' cognitive workload decreased the amount of missed nursing care needs. In addition, a one-unit increase in cognitive workload provides a decrease of 0.162 in the amount of missed nursing care needs (Table 4).

4. Discussion

Due to the working style of healthcare institutions and the nature of healthcare services, those working in these institutions are exposed not only to physical workload but also to mental workload. It has been revealed in many studies conducted in different countries [8,9,10] that the mental workload of nurses, who are in the most intense communication and interaction with the patient, especially in patient

care processes, and who are often responsible for ensuring the coordination of the services provided, is high. As in these studies, it was found that the mental workloads of nurses were high in the present study and that performance-related workload and cognitive workloads were higher than emotional workload and temporary workloads (Table 2). This situation is considered as an expected situation. Because the tasks carried out by nurses, the content of their work, and the way they work are generally similar, and mental workload also depends on these factors. The results of the study are consistent with other studies, which also revealed that nurses have high mental workloads even if they work in different areas such as surgical units, intensive care, etc. [13,16,36,37,38,39]. In a study conducted by Teng et al. [40] on intensive care nurses, it was found that nurses' mental workload was high. Another study found that nurses working in the emergency department had a high workload [40,41]. In a study conducted by Gündüz and Öztürk [20], the mental workload of nurses working in intensive care units was found to be high. These studies support the findings of the study because of the high mental workload. However, the fact that intensive care and emergency services were not included in this study causes the results to differ from these studies.

Performance-related workload refers to the workload for tasks that require attention, do not accept errors, have a high level of responsibility, require careful reactions and have serious consequences of errors [1]. These tasks mostly cover the critical tasks of nurses for patient care and medical intervention processes. Considering that the study was conducted on nurses involved in patient care, it can be considered as an expected situation that the performance-related workload of nurses is high. Cognitive workload arises from processes such as information processing, thinking, decision making, making choices, collecting and memorizing information [1]. Nurses are faced with intensive cognitive processes such as collecting new information about the patients they care for every day, keeping and processing this information in mind, and making decisions about patient care processes. Therefore, the high cognitive workload of nurses in the study can be considered as an expected result. It is seen that both performance-related workload and cognitive workload are burdens related to patient care processes, and in a study, it was revealed that 66.44% of the mental workload of nurses consisted of patient care services [42].

The main reason for missing nursing care was identified as lack of supplies and communication problems. (Table 2). Some studies in the literature support our findings [43]. In some studies, unlike our research, the main reason for missing nursing care was identified as labor resources [44, 45, 46]. Although the mental workload levels of nurses are high, the low amount of missed nursing care needs is considered to be a pleasing situation. This situation shows that nurses show their best efforts in patient care, but they experience problems related to labor force resources. These findings are similar to the studies conducted in the literature, in which it was reported that the amount of missed nursing care needs was low and the reason for missed nursing care was manpower-related reasons [47,48,49,50,51] revealing that there are inadequacies in nurse employment and the importance of manpower in order to provide complete and qualified care.

Considering that the majority of the nurses participating in the study were participants with a high level of education and less than 10 years of professional experience, it is thought that the fact that they were in a period when they could be the most efficient in terms of productivity may be effective in reducing the amount of missed care. In previous studies, it has been stated that low education level and high working hours increase missed nursing care [52] which supports this idea.

In the study, it was found that there was no relationship between the total mental workload, temporary workload, emotional workload and performance-related workload of nurses and the amount and causes of missed nursing care needs. This situation is considered as a positive situation and it can be said that nurses manage their temporary, emotional and performance-related workloads well and therefore care is not affected.

When the relationship between mental workload of nurses and missed nursing care needs was examined; while there was no statistically significant relationship between temporary workload, emotional workload, performance-related workload and total mental workload and the amount and reasons for missed nursing care needs, and between cognitive workload and the reasons for missed nursing care needs ($r = -.105$, $p = .318$), there was no statistically significant relationship; a negative, statistically significant and very weak relationship was found between the amount of missed nursing care needs (Table 3). This weak relationship differs from the research findings in some studies in the literature [20,53]. It is thought that the reason for this difference may be due to the sample groups in which the research was conducted. The correlation coefficient between cognitive workload and missed nursing care was relatively low ($r = -0.226$) and the amount of variance explained in the regression model was also minimal ($R^2 = 0.051$), indicating that cognitive workload only explains a small portion of the variance in missed nursing care and suggesting that contextual variables other than mental workload may play a more important role in missing care (Table 4). The presence of small effect sizes in the study may be due to the sample size. On the other hand, the fact that nurses hesitate to make correct statements about missing care may have been reflected in some research findings. In the study, the fact that nursing care could not be met due to labor resources suggests that nurses do not have enough staff qualitatively or quantitatively and this situation causes nurses to have to work more cognitively and increase their cognitive workload. In addition, nurses first use their cognitive functions to make plans and interventions related to the care of patients. Cognitively, the fact that nurses have the right information, process the information correctly, think effectively, make the right decisions, make the right choices, keep the collected information in mind, analyze it, etc. It can be said that experiencing intense processes reduces missed nursing care by enabling them to do things correctly and effectively.

4.1. Limitations

The fact that mostly female nurses work in the inpatient services of the institution has caused a gender imbalance in the sample group. At the same time, the sample group consists of a total of 93 nurses, which reduces the generalizability of the study. In this study, Cognitive Workload: 0.57 and Temporal Workload: 0.64 Cronbach alpha values are relatively low and this can be considered as a limitation of the internal consistency of the tool. Another limitation of the study is that the correlation coefficient between cognitive workload and missed nursing care is relatively low, and the amount of variance explained in the regression model is minimal. The results of the study are limited to the self-assessments of the nurses who worked in the institution where the study was conducted and participated in the study. In addition, the lack of studies that revealed the effect of mental workload on missed nursing care has caused limitations in the discussion of the study findings.

5. Conclusion

It is estimated that if cognitive workload is reduced, nurses' missing care rates will decrease. It is estimated that if mental workload is reduced in nurses, many positive results will occur such as ensuring patient safety, preventing medical errors, reducing hospital stays, infections and work accidents. Managers have important duties in reducing mental workload in nurses. For example, preventing the reasons that increase mental workload, optimizing nurse-patient ratios and developing workload balancing strategies are important and necessary. It is recommended that the effect of mental workload on missing care in nurses be investigated in different sample groups and with different concepts.

Ethical statement:

Before starting the research, ethical approval was obtained from the ethics committee of the Bandırma Onyedi Eylül University (Date: 06.01.2024 Number: 2023-272).

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Conflict of Interest:

The authors report no actual or potential conflicts of interest.

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Authors' Contributions:

N.E.S: Conceptualization, Methodology, Data Collection, Formal analysis, Writing - Original draft preparation, Investigation.

H.D.: Conceptualization, Methodology, Formal analysis, Original draft preparation, Investigation.

S.A.: Conceptualization, Methodology, - Formal analysis, Original draft preparation, Investigation.

All authors read and approved the final manuscript.

Generative AI Statement

The author(s) declare that no Gen AI was used in the creation of this manuscript.

References

- [1] Yavuz, M., Akça, M., Tepe Küçükoğlu, M., “Measurement of mental workload: Turkish adaptation of CarMen-Q questionnaire”, *Journal of Yasar University*, 15(60), 675-691, 2020.
- [2] Sungur, C., Ceylan, A., “Work Overload in Hospitals. In: Health Management: Current Issues and Practical Information (Ed.: Dökme Yağar, S. & Yağar, F.), Education Publishing, 1. 1st Edition, Ankara, 2023.
- [3] Carayon, P., Gürses, A. P. (2008). “A human factors engineering conceptual framework of nursing workload and patient safety in intensive care units”, *Intensive and Critical Care Nursing*, 24(5), 284–295, 2008. [Doi: 10.1016/j.iccn.2007.10.002](https://doi.org/10.1016/j.iccn.2007.10.002)
- [4] Demir, E. “The relationship between workload and burnout among intensive care nurses”, *Journal of Nursing Research and Development*, 22(1):1–10, 2020.
- [5] Aiken, L.H, Clarke, S.P, Sloane, D.M, Sochalski, J., Silber JH. “Hospital nurse staffing and patient mortality, nurse burnout, and job dissatisfaction”, *JAMA*. 288(16):1987–93, 2002. [Doi:10.1001/Jama.288.16.1987](https://doi.org/10.1001/Jama.288.16.1987)
- [6] Holden, R.J., Scanlon, M.C., Patel, N.R., Kaushal, R., Escoto, K.H., Brown, R.L., et al. “A human factors framework and study of the effect of nursing workload on patient safety and employee quality of working life”, *BMJ Qual Saf*, 20(1):15–24, 2011. [Doi:10.1136/Bmjqs.2008.028381](https://doi.org/10.1136/Bmjqs.2008.028381)
- [7] Wiegmann, D.A., ElBardissi, A.W., Dearani, J.A., Daly, R.C., Sundt, T.M. “Disruptions in surgical flow and their relationship to surgical errors: an exploratory investigation”, *Surgery*, 142(5):658–65, 2007. [Doi:10.1016/J.Surg.2007.07.034](https://doi.org/10.1016/J.Surg.2007.07.034)

- [8] Yuan, Z., Wang, J., Feng, F., Jin, M., Xie, W., He, H., & Teng, M., “The levels and related factors of mental workload among nurses: A systematic review and meta-analysis” *International Journal of Nursing Practice*, 29(5), e13148, 2023. <https://doi.org/10.1111/ijn.1314812>
- [9] Destiani, W., Mediawati, AS., & Permana, RH., “The mental workload of nurses in the role of nursing care providers”. *Journal of Nursing Care*, 3(1), 11-18, 2020. Doi: 10.24198/jnc.v3i1.22938
- [10] Naserian, E., Pouladi, S., Bagherzadeh, R. et al., “Relationship between mental workload and musculoskeletal disorders with intention to leave service among nurses working at neonatal and pediatric departments: a cross-sectional study in Iran”, *BMC Nursing* 23; 438; 1-11, 2024. <https://doi.org/10.1186/s12912-024-02112-7>
- [11] Jin, M., Qian, R., Wang, J., Long, J., Yuan, Z., Zeng, L., Liao, D., Liu, X., Tang, S., Huang, S., “Influencing factors associated with mental workload among nurses: A latent profile analysis”, *Int J Nurs Sci*.11(3), 330-337, 2024. doi: 10.1016/j.ijnss.2024.04.002.
- [12] Nourollahi-Darabad, M., Afshari, D., Karimi, N., Seyedtabib, M., “Psychosocial and Demographic Factors Impacting the Mental Workload of Nurses: A Proposed Structural Equation Model”, *Jundishapur Journal of Chronic Disease Care*. 14(1): e145047, 2025. <https://doi.org/10.5812/jjcdc-145047>.
- [13] Nasirizad Moghadam, K., Chehrzad, MM., Reza Masouleh, S., Maleki, M., Mardani, A., Atharyan, S., Harding, C., “Nursing physical workload and mental workload in intensive care units: Are they related?”, *Nurs Open*. 8(4):1625-1633, 2021. doi: 10.1002/nop2.785.
- [14] Fikri, Z., Bellarifanda, A., Sunardi, S., ‘Ibad, MR., & Mu’jizah, K., “The relationship between mental workload and nurse stress levels in hospitals”, *Healthcare in Low-Resource Settings*, 12(11817), <https://doi.org/10.4081/hls.2023.11817>
- [15] Kazemi-Galougahi, MH., Feizabadi, E., “Using signal detection test to assess the correlation between daily sleep duration, mental workload, and attention sensitivity in nurses”, *BMC Nursing*, 23, 851, 2024. <https://doi.org/10.1186/s12912-024-02515-6>
- [16] Sevinik, H., & Lök, N., “Determination of relationship between mental workload and work performance in nurses” *Göbeklitepe Medical Science Journal*, 5(8), 37–44, 2022. <https://doi.org/10.55433/gsbj.178>
- [17] Gaba, D.,M, Howard, S.K. “Fatigue among clinicians and the safety of patients”, *N Engl J Med*. 347(16):1249–55, 2002. Doi:10.1056/Nejmsa020846
- [18] Dönmez, E., Demir, Y. “The relationship between burnout levels and job satisfaction among nurses”, *Turkish Clinics Journal of Nursing Sciences*, 11(2):114–22, 2019.
- [19] Jennings, B.M. “Work stress and burnout among nurses: Role of the work environment and working conditions” In: Hughes RG, editor. *Patient Safety and Quality: An Evidence-Based Handbook for Nurses*. Vol. 2. Rockville, MD: Agency for Healthcare Research and Quality, p. 137-58, 2008.
- [20] Gündüz, E.S, Öztürk, N.K. “Mental workload as a predictor of burnout in intensive care nurses”, *Nurs Crit Care*, 30(2):e13173, 2005.
- [21] Kalisch, BJ., & Williams, RA., “Development and psychometric testing of a tool to measure missed nursing care”, *JONA: The Journal of Nursing Administration*, 39(5), 211-219, 2009.

- [22] Kalisch, B.J. “Missed nursing care: a qualitative study”, *J Nurs Care Qual*, 21(4):306–13, 2006. Doi:10.1097/00001786-200610000-00006
- [23] Ball, J.E., Murrells, T., Rafferty, A.M., Morrow, E., Griffiths, P. “‘Care left undone’ during nursing shifts: associations with workload and perceived quality of care”, *BMJ Qual Saf*, 23(2):116–25 2014. Doi:10.1136/Bmjqs-2012-001767
- [24] Ball, J.E, Barker, H., Griffiths, P., Jones, J., Lawless, J., Burton, C, et al. “Implementation and impact of missed care interventions: a rapid review” *Health Serv Deliv Res*. 6(35), 2018. Doi:10.3310/Hsdr06350
- [25] Jones, T.L., Hamilton, P., Murry, N. “Unfinished nursing care, missed care, and implicitly rationed care: state of the science review”, *Int J Nurs Stud.*, 52(6):1121–37, 2015. Doi:10.1016/J.ijnurstu.2015.02.012
- [26] Kalisch, B.J, Landstrom, G.L, Hinshaw AS. “Missed nursing care: a concept analysis” *J Adv Nurs*. 65(7):1509–17, 2009. Doi:10.1111/J.1365-2648.2009.05027.X
- [27] Ball, JE., Bruyneelc, L., Aikend, L. H., Sermeusc, W., Sloaned, D. M., Raffertye, A. M., ...& Consortium, R., “Post-operative mortality, missed care and nurse staffing” *Physiology & Behavior*, 176 (3), 139-148, 2018. <https://doi.org/10.1016/j.ijnurstu.2017.08.004>.Post-operative
- [28] Griffiths, P., Ball, J., Ora, CD., Maruotti, A., Meredith, P. & Smith, G. B., “The association between nurse staffing and omissions in nursing care: A systematic review”, *Journal of Advanced Nursing*, 14, 1474-1487, 2018. <https://doi.org/10.1111/jan.13564>
- [29] Henderson, J., Willis, E., Xiao, L. & Blackman, I., “Missed care in residential aged care in Australia: An exploratory study”, *Collegian*, 24(5), 411-416, 2017. <https://doi.org/10.1016/j.colegn.2016.09.001>
- [30] Kalisch, BJ., Terzioglu, F. & Duygulu, S., “The misscare Survey-Turkish: Psychometric properties and findings”. *Nursing Economics*, 30(1), 29-37, 2012.
- [31] Mantovan, F., Muzzana, C., Schubert, M. & Ausserhofer, D., “It’s about how we do it, not if we do it. Nurses’ experiences with implicit rationing of nursing care in acute care hospitals: A descriptive qualitative study”, *International Journal of Nursing Studies*, 109, 2020. <https://doi.org/10.1016/j.ijnurstu.2020.103688>
- [32] Özkartal, Z, The Effect of Nurses' Individual Workload Perception on Missed Nursing Care, Master's thesis, Marmara University, Istanbul, Turkey, 2023.
- [33] Yang, Y., Chang, H., Guo, S., Gao, X. L., Wang, L., & Ma, A, “Self-compassion and work engagement among Chinese nurses: exploring mediating effects of depression, anxiety, and stress” *Frontiers in Public Health*, 12, 1420384, 2024.
- [34] Daniel, W.W. “*Biostatistics: A foundation for analysis in the health sciences*”, 7th ed. New York: John Wiley & Sons, 1999.
- [35] Büyüköztürk, Ş. “*Data Analysis Handbook for Social Sciences: Statistics, Research Design, SPSS Applications and Interpretation*” Ankara: Pegem Academy, 2021.
- [36] Rubio-Valdehita, S., López-Núñez, M. I., López-Higes, R., & Díaz-Ramiro, E. M., “Development of the CarMen-Q Questionnaire for mental workload assessment” *Psicothema*, 29(4), 570-576, 2017.

- [37] Habibi, E., Taheri, M., & Hasanzadeh, A., "Relationship between mental workload and musculoskeletal disorders among Alzahra Hospital nurses", *Iranian Journal of Nursing and Midwifery Research*, 20(1), 1-6, 2015.
- [38] Iftadi, I., Astuti, R., & Rosita, M., "Using NASA task load index and Maslach burnout inventory for evaluating the subjective mental and physical workload of nurse central surgical installation hospitals Karanganyar", 2nd International Conference of Industrial, Mechanical, Electrical, Chemical Engineering (ICIMECE), Yogyakarta, Indonesia, Volume: 1, 2016 p.p.127-131.
- [39] Sönmez, B., Oğuz, Z., Kutlu, L., & Yıldırım, A., "Determination of nurses' mental workloads using subjective methods", *Journal of Clinical Nursing*, 26, 514-523, 2017.
doi:10.1111/jocn.13476
- [40] Teng, M., Yuan, Z., He H., Wang, J. "Levels and influencing factors of mental workload among intensive care unit nurses: a systematic review and meta-analysis", *Int J Nurs Pract*, 30(4):e13167, 2024.
- [41] Yuan, Z., Wang, J., Feng, F., Jin, M., Xie, W., He H., Teng, M. "The levels and related factors of mental workload among nurses: a systematic review and meta-analysis" *Int J Nurs Pract*, 29(5):e13148, 2023
- [42] Karadağ, M. & Cankul, İH., "The Evaluation of Mental Workload in Nurses", *Anadolu Hemşirelik ve Sağlık Bilimleri Dergisi*, 18(1), 26-34, 2015. <https://doi.org/10.17049/ahsbd.46804>
- [43] Cengia, M.G., Palese, A., Saiani, L., Brugnaro, L., Di Falco, A., Mezzalira, E., et al. "Frequency and reasons for missed nursing care: A cross-sectional study in Veneto Region hospital" *Assist Inferm Ric*, 43(3):105–17, 2024.
- [44] Lafçı, D., Canlı, F. "Evaluation of missed nursing care needs and reasons in a hospital in Turkey: a comparative cross-sectional study" *Journal of Health Academicians*, 11(4):456–64, 2024.
- [45] Taskiran Eskici, G., Baykal, U. "Frequency, reasons, correlates and predictors of missed nursing care in Turkey: a multi-hospital cross-sectional study" *Int J Nurs Pract*, 28(5):e13050, 2022.
- [46] Chegini, Z., Jafari-Koshki, T., Kheiri, M., Behforoz, A., Aliyari, S., Mitra, U., et al. "Missed nursing care and related factors in Iranian hospitals: a cross-sectional survey", *J Nurs Manag*, 28(8):2205–15, 2020.
- [47] Adıgüzel, V. Examination of missed nursing care requirements and their causes, Master's thesis, Hasan Kalyoncu University, Gaziantep, Turkey, 2021.
- [48] Güleşen, G., "An Important Concept in Nursing Care: Missed Nursing Care and Reasons", *Turkish Journal of Health Sciences and Research*, 5(1), 42-49, 2022.
<https://doi.org/10.51536/tusbad.1042757>
- [49] İlaslan, N. & Yıldırım Şişman N., "Evaluation of nurses in a university hospital for the amount and reasons of missed nursing need". *Cukurova Medical Journal*, 44(4),1226-3, 2019.
Doi:10.17826/cumj.509488
- [50] Lafcı Bakar, D. & Canlı, F., "Evaluation of missed nursing care needs and reasons in a hospital of turkey: A comparative cross-sectional study" *Health Care Academician Journal*, 11(4), 456-464, 2024. <https://doi.org/10.52880/sagakaderg.1380677>

- [51] Taşkıran Eskici, G., & Baykal, Ü., “Missed nursing care”, *Journal of Health and Nursing Management*, 8(1):104-110, 2021. doi:10.5222/SHYD.2021.28190
- [52] Ergezen FD, Kol E., “Karşılanamayan hemşirelik bakımı”, *Journal of Education and Research in Nursing*. 18(4): 467–472, 2021. Doi: 10.5152/jern.2021.16768.
- [53] Nasirizad Moghadam, K., Chehrzad, M.M., Masouleh, S.R, Maleki, M., Mardani, A., Atharyan, S., Harding, C. “Nursing physical workload and mental workload in intensive care units: are they related?” *Nurs Open*. 8(4):1625–33, 2021.