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Assessing fatigue among ICU nurses using the Yoshitake fatigue questionnaire — a pilot study

Krzemińska Sylwia¹, Guzik Natalia², Borodzicz Adriana¹, Bąk Ewelina³,
Arendarczyk Marta¹

¹Department of Clinical Nursing Faculty of Health Sciences, Medical University, 50-367 Wrocław, Poland

²Anesthesiology and Intensive Therapy Unit, IV Military Clinical Hospital in Wrocław

³Faculty of Health Sciences, University of Bielsko-Biala, 43-309 Bielsko-Biala, Poland

Abstract:

Nurses' fatigue has a substantial impact on patient health, and even survival. Since early detection of risks through observation is essential to preventing health complications in patients, insufficient numbers of nursing staff and their excessive workload contribute to higher patient treatment costs. The above considerations were the motivation for the present study, which attempts to assess fatigue among nurses in intensive care units (ICUs).

The purpose of the study was to determine the severity of fatigue in anesthesiology and intensive care nurses, and to investigate the relationship between nurses' workload and fatigue, which comprised reduced activity, reduced motivation, and physical fatigue symptoms.

Material and methods: The study included 54 anesthesiology nurses working in an intensive care unit. The research instrument used was the Yoshitake fatigue questionnaire.

Conclusions: Nurses working in intensive care units experience high levels of fatigue. Fatigue was most severe with regard to motivation, followed by physical fatigue, and then activity. As for specific symptoms, the most significant included: "heaviness in the legs", "wanting to lie down", "becoming nervous", "back pain", and "feeling thirsty". Large-scale research on nurse fatigue is warranted.

Key words: fatigue, nurse, ICU

Introduction

The term “fatigue” mainly pertains to factors associated with workload. These factors can be categorized into two groups: physical load, i.e. burden on the osteoarticular system, and psychological load, which includes problems with concentration, attention, and perception. Both types of factors are extremely relevant in the work of a nurse. To perform this work, nurses rely both on their physical fitness, and their psychological fitness, associated with constant focus.

Fatigue always affects the quality of patient care, which may be exacerbated by insufficient staffing. In a study by Ewa Rogula, fatigue and haste were common causes of errors in the work of anesthesiology nurses [1].

In the international literature on the subject, the term “workload” is commonly used. It appears in numerous studies, many of which concern the work of nurses. Multiple studies published in the West provide evidence of the significance of nurses’ workload and staff shortages in terms of adverse patient outcomes. Some studies demonstrate a correlation between nurse workload and staff shortages on the one hand, and patient mortality on the other. Other studies also list specific complications that may occur in patients due to nursing staff shortages. These include complications associated with treatment, but also medical errors resulting from fatigue, which may adversely affect patient health.

Similar conclusions were also reported by Tarnow-Mordi and colleagues, who studied patient mortality in an intensive care unit (ICU) in relation to nurse workload. This retrospective study demonstrated an association between nurse workload and patient mortality. In units with excessive workload, patient mortality was two times higher [2].

Nurses’ fatigue may have a substantial impact on patient health, and even survival. Since early detection of risks through observation is essential to preventing health complications in patients, insufficient numbers of nursing staff and their excessive workload contribute to higher patient treatment costs. The above considerations were the motivation for the present study, which attempts to assess fatigue among nurses in ICUs.

The purpose of the study was to determine the severity of fatigue in anesthesiology and intensive care nurses, and to investigate the relationship between nurses’ workload and fatigue, which comprised reduced activity, reduced motivation, and physical fatigue symptoms.

Material and methods

The study included a group of anesthesiology nurses working in an ICU. The inclusion criterion was being employed full time under a permanent employment contract. Participation was voluntary, and respondents were completely anonymous. All nurses included in the study were informed of its purpose and procedure, and made aware that they could withdraw from the study at any time.

Research material for the study was collected using the diagnostic survey method, with the following research instruments:

- A socio-demographic survey to collect data on the respondents' sex, age, education, place of employment, duration of employment (in years), position, hospital, other jobs, skills, and satisfaction with work.
- A standardized questionnaire to assess the respondents' perceived fatigue at work, adapted to the Polish setting by Professor Ryszard Paluch from the Wrocław University of Science and Technology [3]. The Yoshitake fatigue questionnaire [4] comprises thirty statements assessing the respondents' subjective feeling of fatigue. The questionnaire also allows for calculating physical and mental fatigue scores or percentages based on the fatigue symptoms identified. It comprises thirty symptoms divided into three groups of ten.

Each nurse evaluated their perceived fatigue by choosing a response to each of the thirty symptoms included in the scale. Then, a fatigue score was calculated, reflecting fatigue in three groups:

- reduced activity, which included: wanting to lie down, feeling drowsy, feeling muddled, strained eyes, heaviness in the body, heaviness in the legs, rigid and clumsy movement, feeling unsteady when standing, heaviness in the head, yawning;
- reduced motivation: impatience, indecisiveness, difficulty in focusing, indifference, slower thinking, absent-mindedness, distractedness, anxiety, becoming tired of talking, becoming nervous;
- physical fatigue symptoms: tension in the shoulders, eyelid twitching, tremor in the limbs, labored breathing, dizziness, headache, hoarse voice, feeling thirsty, back pain, and stiff neck.

Each item was scored between 0, denoting “not at all”, and 5, denoting “definitely yes”. The result was calculated by summing the item scores.

Results

Tab.1.Characteristics of the study group

		n	%
Sex	Female	52	96,3
	Male	2	3,7
Education	Medical high school	26	48,1
	Preuniversity	21	38,9
	Master's degree in nursing	7	13,0
ICU specjalizacjon	Yes	27	50,0
	No	27	50,0
Job satisfaction	Yes	45	83,3
	No	9	16,7
	Sum	54	100,0

The results of the Yoshitaki questionnaire to assess fatigue

The general fatigue index is determined by the formula:
 $A \geq \text{lub} \leq B \geq \text{lub} \leq C$

Where A determines the symptoms of decrease in activation
 B determines the symptoms of a reduced motivation, and C indicates the symptoms of physical fatigue

Tab. 2. Overall fatigue index - sum of all responses

sum of all responses	N	M	Me	SD	Min	Maks
Symptoms of decrease in activation A - sum	54	20,28	20,0	6,554	0	32
Symptoms of decrease in motivation B - sum	54	16,06	15,5	8,039	0	34
Symptoms of physical fatigue C - sum	54	17,50	19,0	7,689	0	38
Overall fatigue index - sum	54	53,83	56,5	19,115	0	102



Fig.1. The general point fatigue index.

Table 3. General indicator of fatigue - percentage response rate.

The overall fatigue index	N	M	Me	SD	Min	Maks
Symptoms of decrease activation A - percentage indicator	54	50,69	50,0	16,386	0	80
Symptoms of decrease in motivation B - percentage indicator	54	40,14	38,8	20,097	0	85
Symptoms of physical fatigue C - percentage indicator	54	43,75	47,5	19,223	0	95
The overall fatigue index	54	44,86	47,1	15,930	0	85

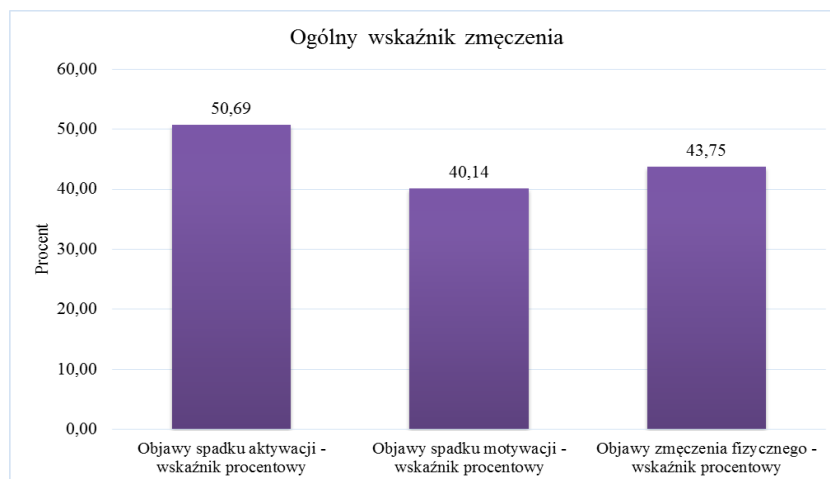


Fig.2. The general rate of fatigue percentage values.

The overall fatigue index is as follows: $B > C > A$

or symptoms of decrease in motivation > symptoms of physical fatigue > signs of decline in activation.

Tab. 4. Symptoms of decrease in A. activation

Symptoms of decrease in A. activation	N	M	Me	SD	Min	Maks
A1 wanting to lie down	54	2,70	3,0	1,238	0	4
A2 feeling drowsy	54	2,35	3,0	1,261	0	4
A3 feeling muddled	54	1,33	1,0	1,064	0	4
A4 strained eyes	54	2,35	3,0	1,168	0	4
A5 heaviness in the body	54	2,24	3,0	1,288	0	4
A6 heaviness in the legs	54	2,91	3,0	1,086	0	4
A7 rigid and clumsy movement	54	1,59	1,0	1,158	0	4
A8 feeling unsteady when standing	54	0,85	1,0	0,856	0	3
A9 heaviness in the head	54	1,69	1,0	1,146	0	4
A10 yawning	54	2,26	3,0	1,200	0	4

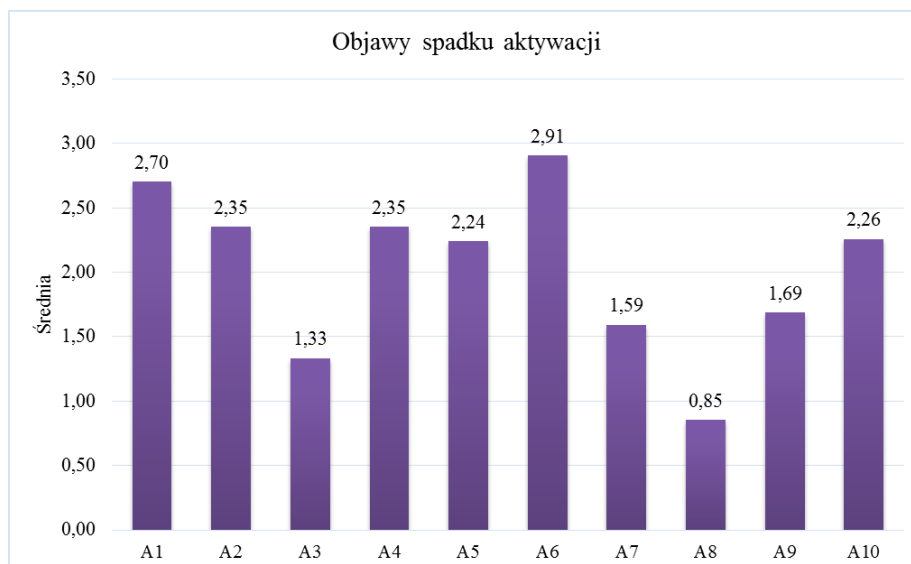


Fig.3. Symptoms of decrease in activation.

Regarding the part concerning symptoms of decrease in activation, respondents most often indicated the symptom A6 heaviness in the legs ($M= 2,91$)
 The second was the symptom A1 czyli wanting to lie down ($M =2,7$) i A 2 feeling drowsy and A 5 heaviness in the body ($M=2,35$). The least frequently indicated symptom of decrease in activation was A8 feeling unsteady when standing ($M=0,85$)

Tab. 5. Symptoms of reduced motivation B

Symptoms of reduced motivation B	N	M	Me	SD	Min	Maks
B1 impatience	54	1,76	1,0	1,345	0	4
B2 indecisiveness	54	1,15	1,0	0,998	0	4
B3 difficulty in focusing	54	1,52	1,0	1,094	0	4
B4 indifference	54	1,54	1,0	1,224	0	4
B5 slower thinking	54	1,43	1,0	1,021	0	3
B6 absent-mindedness	54	1,46	1,0	1,059	0	3
B7 distractedness	54	1,50	1,0	1,060	0	3
B8 anxiety	54	1,89	2,0	1,160	0	4
B9 becoming tired of talking	54	1,50	1,0	1,145	0	4
B10 becoming nervous	54	2,31	3,0	1,371	0	4

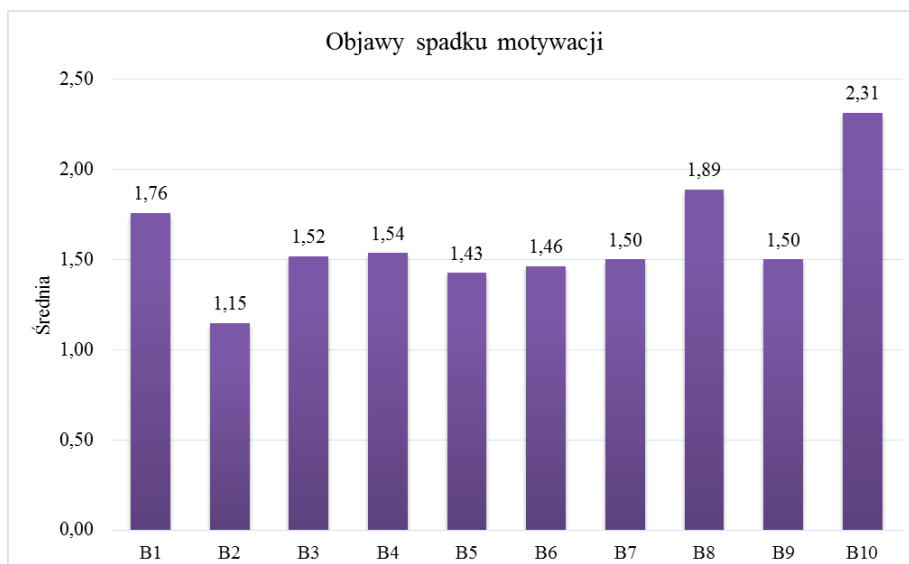


Fig. 4. Symptoms of decrease in motivation

In reference to the part concerning the symptoms of the reduced motivation, the respondents most often indicated the symptom B10 becoming nervous ($M=2,31$)
 The second was the symptom B8 anxiety ($M=1,89$).
 The symptom was the least frequently indicated symptom of the reduced motivation B2 indecisiveness ($M=1,15$)

Tab.6. Symptoms of physical fatigue C

Symptoms of physical fatigue C	N	M	Me	SD	Min	Maks
C1 tension in the shoulders	54	2,04	2,5	1,479	0	4
C2 eyelid twitching	54	0,98	1,0	1,055	0	4
C3 tremor in the limbs	54	1,26	1,0	1,049	0	4
C4 labored breathing	54	0,70	0,5	0,924	0	4
C5 dizziness	54	1,13	1,0	1,117	0	4
C6 headache	54	2,24	3,0	1,258	0	4
C7 hoarse voice	54	0,93	1,0	1,096	0	4
C8 feeling thirsty	54	3,02	3,0	1,124	0	4
C9 back pain	54	3,17	4,0	1,225	0	4
C10B stiff neck	54	2,04	3,0	1,578	0	4

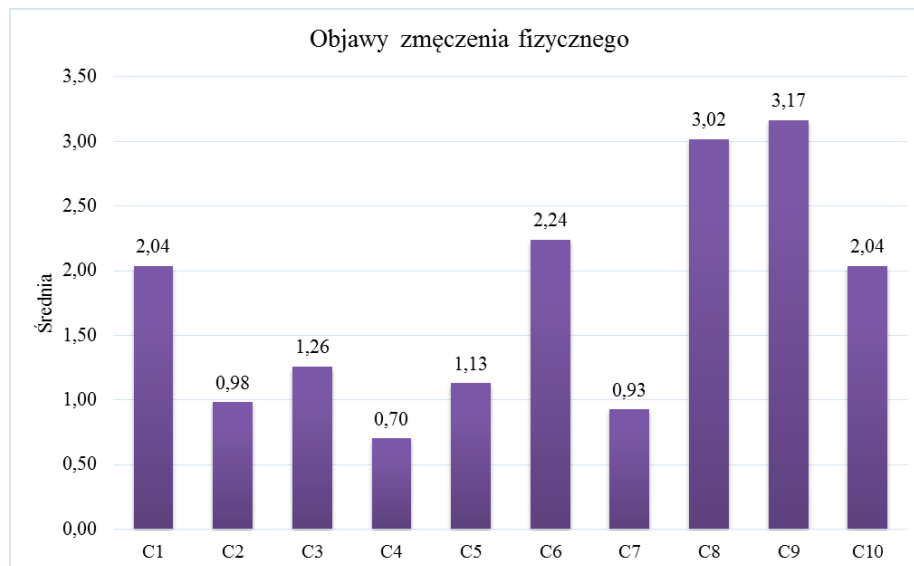


Fig. 5. Symptoms of physical fatigue

Regarding the part concerning symptoms of physical fatigue respondents most often indicated the symptom C9 back pain ($M=3,17$). The second was the symptom C8 feeling thirsty ($M=3,02$). The symptom was the least frequently indicated symptom of fatigue C4 labored breathing ($M=0,7$)

Discussion

The ergonomics of nurses' work environments have been discussed for many years now. Research by M. I. Wyderka and T. Niedzielska demonstrated that nurses' work involves both physical load on the musculoskeletal system and psychological load. This work is difficult in a number of aspects, especially in light of multiple stressful situations that occur in ICUs. Nurses need a "clear head" to correctly perform the multitude of complex actions and procedures required of them, often under considerable stress. In fact, even a single error by a nurse may cause death of a patient [5].

Strong emotional involvement accelerates the development of fatigue, which causes difficulty in focusing. Nurses experience a great burden of responsibility, which, especially in times of health care cost reduction, may become overwhelming. The decreasing ratio of nurses per hospital bed negatively affects the ergonomics of nurses' work. Considering the scope of performed activities, attending to patient needs, difficulties in accessing medical supplies that need to be moved or unpacked, and obstacles in cooperation with others, one can more easily understand the chaos faced by nurses in their demanding work. With strong emotions, also ingrained in the work, maintaining focus and a "clear head" becomes impossible. Shift work and nights on call also affect nurses' overall wellbeing. Many factors comprising nurses' workload could, however, be modified or improved so as to protect nurses' health and increase their comfort at work.

In view of the above, it seems that nurses' working conditions are a substantial factor not only in the workload discussed, but also in the quality of health care offered [5, 6].

When investigating workload and fatigue, one may analyze the structure of the workplace and the tasks performed, or the condition of the person performing the work. The former approach disregards subjective variables such as age, sex, work experience, or skills. The latter includes individual capabilities, as well as the difficulty of tasks performed, and the impact of the internal and external environment. One instrument that can be used in such measurements is the Yoshitake fatigue questionnaire, which evaluates the subjective feeling of fatigue in terms of activity, motivation, and physical fatigue. Other instruments, e.g. assessing psychological or psycho-physical load at work, can also be useful. The study group included 54 nurses, and was not balanced in terms of sex. 52 respondents (96.3%) were female, and 2 (3.7%) were male, which warrants the conclusion that nursing is a female-dominated occupation. This is also corroborated by numerous other studies involving nursing staff [9, 10]. Most respondents, 26 (48.1%), finished vocational school. 21 (38.9%) had a bachelor's degree, and 7 (13%) had a master's degree. Half of the respondents (27 nurses) specialized in Anesthesiology and Intensive Care Nursing; the study did not include nurses in the course of specialization or with other specialties. In a study on psychological load involved in the work of nurses by K. Kulczycka and E. Stychno, respondents stated that advanced professional skills are necessary to ensure patient safety [11], which was reflected in the number of respondents with a specialty. Contrary results were obtained by L. Ścisło et al. [12], where only 9.5% of respondents completed a specialty course. 45 respondents (83.3%) derived satisfaction from their work, while 9 (16.7%) reported they were not satisfied.

The youngest respondent was 22 years old, the oldest — 60 years old. Mean respondent age was 42.7, similar to that reported by the Polish Nurses and Midwives' Association. In 2015, the largest number of nurses fell into the 35–44 and 45–54 age brackets, while in 2013, the mean age was 48.7 years [13]. The least experienced nurse had worked for 1 month, the most experienced, for 40 years. The mean number of years in nursing was 21.38. The shortest duration of employment at ICU was 1 month, the longest, 40 years. The mean duration of employment at ICU was 18.43 years.

Overall, symptoms of reduced motivation were more severe than symptoms of physical fatigue, which in turn were more severe than symptoms of reduced activity.

With regard to specific symptoms in each category, detailed analysis showed the following results. Among the symptoms of reduced activity, the most severe were “heaviness in the legs” ($M = 2.91$ points) and “wanting to lie down” ($M = 2.7$); the top symptom of reduced motivation was “becoming nervous” ($M = 2.31$ points), while physical fatigue was mostly present as “back pain” ($M = 3.17$) and “feeling thirsty” ($M = 3.02$). These findings are consistent with those reported by Kwiecień-Jaguś K. and Wujtewicz M. [10]. In a study by P. Gawęł, nurses ending their shift at an internal medicine ward also wanted to lie down, felt drowsy, and experienced heaviness in the legs [14].

It has been established that nurses' workload is high. Moreover, the decreasing interest in the profession, associated, among other factors, with the poor ergonomics involved, results in diminishing numbers of nursing staff. High levels of stress and difficulties with performing all the required tasks are likely to result in occupational burnout [5]. As reported by Edyta K. Cudak and Danuta Dyk, the workload of ICU nurses is also affected by serious condition of the patients treated [15]. Bearing in mind the multiple factors contributing to the burden and responsibility involved in the work of nurses, no effort should be spared to improve their working conditions in the future, in terms of medical staff numbers, monitoring nurses' fatigue, and practical implementation of the principles of ergonomics.

Conclusions:

1. Nurses working in intensive care units experience high levels of fatigue.
2. Fatigue was most severe with regard to motivation, followed by physical fatigue, and then activity.
3. Considering specific symptoms, the most significant included: "heaviness in the legs", "wanting to lie down", "becoming nervous", "back pain", and "feeling thirsty".
4. Large-scale research on nurse fatigue is warranted.

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