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Work-related stress of nurses in Poland and Lithuania: countries under the influence of war circumstances in Ukraine

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Abstract

Background Nursing is a challenging profession, often associated with high levels of work-related stress. Recent geopolitical events, such as the conflict in Ukraine, may further exacerbate stress among healthcare workers in neighbouring regions. Understanding stress levels among nurses is crucial for enhancing patient care and improving the well-being of medical staff.

Objective This study aims to assess work-related stress among nurses in Poland and Lithuania, taking into account the potential impact of regional geopolitical factors.

Methodology This cross-sectional study was conducted among 482 Polish and 380 Lithuanian nurses. The online survey was performed using the standardized Expanded Nursing Stress Scale (ENSS). To compare quantitative variables between groups, the Mann-Whitney and the Kruskal-Wallis test (with Dunn's post-hoc test) were used. The significance level was set at 0.05, and effect sizes were calculated using Pearson's correlation coefficient (r) and eta-squared (η^2).

Results The overall stress level (ENSS total score), as well as scores across all analyzed subscales, were significantly higher among Lithuanian nurses (mean = 168.44, SD = 38.56), compared to Polish nurses (mean = 144.13, SD = 34.15), with a statistically significant difference ($p < 0.001$). In Lithuania, significant factors influencing stress levels included age ($p = 0.049$) and place of work ($p = 0.026$), while in Poland, gender ($p = 0.034$), seniority ($p = 0.002$), education ($p = 0.01$), shift work ($p = 0.004$), and workload ($p = 0.001$) were notable factors.

Conclusions Increased stress among nurses in both countries impacts their well-being and patient care quality, highlighting the need for targeted psychological support and better working conditions. Implications for nursing: Nurses play a critical role in healthcare, and mitigating stress through workplace improvements can enhance both their well-being and the quality of care they provide, especially during geopolitical crises. Implementing stress management programs and providing mental health resources are crucial steps to support nurses in high-stress environments.

Keywords ENSS scale, Lithuania, Nurses, Poland, Stress

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Introduction

Nursing is a profession inherently associated with high levels of stress,compounded in recent years by a multitude of factors, including changing conditions in healthcare, increasing patient expectations, and the growing complexity of medical procedures [1, 2]. Stressors such as staff shortages, heavy workloads, and insufficient resources contribute to chronic stress among nurses, with severe implications for their mental and physical health [3]. The expansion of nursing competencies has elevated the profession's prestige but also introduced new responsibilities, further complicating an already demanding work environment [4]. Additionally, the global COVID-19 pandemic has exacerbated these challenges, placing unprecedented pressure on healthcare workers, including nurses, who have faced increased risk of infection, lack of protective equipment, and extended working hours [5, 6]. Moreover, many healthcare systems were overwhelmed, leading to staffing shortages and increased workload, exacerbating burnout [7]. While the occupational stress experienced by nurses has been extensively researched, limited attention has been given to the unique stressors arising from external geopolitical factors, particularly in regions affected by conflict [8, 9]. The significance of this study lies in its focus on understanding the specific stressors faced by nurses in Poland and Lithuania, particularly in the context of the ongoing geopolitical conflict in Ukraine. This study fills a crucial gap by investigating the impact of the ongoing war in Ukraine on nurses in Poland and Lithuania, two countries that are geographically close to the conflict zone. The influx of refugees from Ukraine has introduced additional burdens on healthcare systems, including increased patient loads, language barriers, and the need for specialized care for trauma survivors [10]. Understanding how these geopolitical events influence nurse stress levels is critical not only for improving working conditions but also for ensuring high-quality patient care in regions facing such complex crises. This research provides timely and essential insights into the mental health and stress levels of healthcare professionals in regions directly impacted by geopolitical tensions [8]. Findings from this study have the potential to inform healthcare policy and lead to the development of targeted interventions that address the specific needs of nurses working in conflict-adjacent areas [9]. By highlighting the specific stressors tied to refugee care and geopolitical instability, this study aims to advance our understanding of how external crises affect healthcare workers, offering practical recommendations for supporting the mental health and well-being of nurses in high-stress environments [11, 12].

Furthermore, the significance of this study extends to the broader healthcare community, where stress management and mental health support for medical personnel remain critical for the overall functioning of healthcare systems. Identifying and addressing these stressors can not only improve nurse well-being but also enhance patient outcomes, making this research relevant to policymakers and healthcare administrators globally [13–15].

According to El Arab, the increase in the number of refugees and asylum seekers is a burden not only for social workers but also for medical workers, including nurses [16]. The proximity of the conflict zone in Ukraine to the southeastern Poland and Lithuania, with a significant number of refugees, introduces complex medical and social needs, creating a more demanding work environment for nurses [2, 9, 16]. Additionally, language barriers, complex medical conditions, and limited staff resources should be pointed out [17].

The aim of the study was to assess work-related stress among nurses in the south-eastern part of Poland and Lithuania, considering the geopolitical circumstances of these countries.

To achieving the aim of the study, the following research questions were posed:

- What is the overall level of work-related stress among nurses in Poland and Lithuania, as measured by the Expanded Nurse Stress Scale (ENSS)?
- How does the level of stress manifest across the individual subscales of the ENSS?
- What are the differences in work-related stress levels between nurses from Poland and Lithuania?
- What are the statistically significant factors influencing stress levels among nurses in Poland and Lithuania, as measured by the ENSS?

Materials and methods

Participants and study design

This study used cross-sectional design, and the data were collected using on-line tool from September 2023 to February 2024 among nurses employed in selected medical facilities in the south-eastern part of Poland and Lithuania.

The selection of Lithuania and the south-eastern part of Poland (the Subcarpathian region) as study settings is based on several key factors:

- Proximity to conflict zones: Both regions are in close geographical proximity to Ukraine, a country currently experiencing armed conflict. This proximity places significant psychological and logistical strain on healthcare workers, particularly nurses, who may encounter an increased number of patients suffering from both physical ailments and conflict-related trauma.

- Impact of refugee influx: Due to the conflict in Ukraine, both the Subcarpathian region and Lithuania have seen a substantial influx of refugees. Healthcare systems in these areas must adapt swiftly to accommodate the increased demand for medical care, with additional challenges arising from language barriers and cultural differences. These factors contribute to heightened levels of stress among healthcare professionals, particularly those in frontline roles such as nursing [18].
- Comparable population and healthcare workforce: The populations of the Subcarpathian region of Poland and Lithuania are similar in size [19, 20], as are the numbers of actively employed nurses (20,573 in Poland vs. 21,233 in Lithuania) [21, 22]. This demographic similarity enables a more balanced comparison of work-related stress among nurses in both regions, reducing potential confounding variables related to population or healthcare workforce discrepancies.
- Geopolitical strain on healthcare systems: The geopolitical tension and instability caused by the ongoing conflict create a unique set of stressors for healthcare workers in these regions. These stressors include increased patient loads, emotional challenges related to managing trauma cases, and operational complexities within politically sensitive environments. These factors make the selected regions particularly relevant for studying work-related stress in the nursing profession.
- Healthcare resource disparities: The refugee influx has placed additional pressure on healthcare resources in these regions, exacerbating existing challenges such as staff shortages, extended working hours, and potential compromises in the quality of care. These resource limitations contribute to increased levels of occupational stress among nursing staff.

The selection of Lithuania and the Subcarpathian region of Poland for this study highlights the distinct and multifaceted challenges faced by nurses in these regions, influenced by both geopolitical and sociocultural factors. These regions provide a convenient context for examining the effects of work-related stress on healthcare professionals operating under such demanding circumstances.

Data collection procedure

The convenience sample was used in this study, which included 862 nurses (380 from Lithuania and 482 from Poland). To calculate the minimum sample size a calculator for structural equation models was used (57 items of the questionnaire, divided into 9 subscales, moderate effect 0.3, test power 0.8, significance level 0.05). The minimum sample size for the model was 256 participants [23].

An electronic version of the questionnaire was created using Google Forms and Pollmill.com. To facilitate recruitment, the survey link was disseminated through the regional nursing association and dedicated social media groups exclusively for nurses in both Poland (Subcarpathian region) and Lithuania. Additionally, membership in these groups requires participants to provide their nursing license number during registration, which prevents individuals from other professions from engaging in group discussions or accessing ongoing research. This approach ensured that the study reached the target audience of practicing nurses, thereby enhancing the reliability and validity of the collected data. Collecting responses through online surveys is currently a common and effective method in research, allowing for swift and convenient data gathering. The data collection process is straightforward and efficient, and the design of the questionnaire prevents the identification of individuals while ensuring that only complete surveys are collected [24, 25]. Upon completion of the data collection period, the results were reviewed, exported to an Excel spreadsheet, and subjected to statistical analysis. Regarding data protection and storage, a comprehensive data management process was established. All collected data were securely stored in compliance with General Data Protection Regulation (GDPR) guidelines. We utilized encrypted servers to ensure confidentiality, and access was limited to the research team. The data were anonymized to protect the identities of participants and will be retained only for the duration necessary to complete the study analysis.

The questionnaire provided detailed information about the purpose and nature of the study. Participation in the study was voluntary and anonymous, and completing and submitting the questionnaire responses automatically implied consent to participate. Participants could withdraw from the study at any stage during the completion of the questionnaire.

To ensure the validity of the data, strict inclusion and exclusion criteria were applied to minimize potential confounding factors in the analysis. The following inclusion criteria were adopted for the study: professionally active nurses (with a valid license to practice), working in in medical entities with a probability of contact with refugees, with at least 6 months of professional experience in direct patient care, so that they can reliably assess the level of stress in their work environment, who agreed to participate in the study. Nurses who were on maternity leave, parental leave, or long-term sick leave; nurses who do not work directly with patients (e.g., administrative workers); and those who were unwilling to participate in the study were excluded from the study. Data collection followed standardized procedures using validated

questionnaires, and responses deemed incomplete or inaccurate were excluded from the final analysis. Additionally, a range of statistical tools was employed to analyze the data and identify any potential outliers or deviations.

Ethical considerations

To minimize the risk of bias in the online survey (https://tiny.pl/9z5-qtj8), the following measures were implemented:

- Participant anonymity: The survey was completely anonymous to encourage honest responses, thereby reducing the risk of response bias that may occur in online surveys.
- Sample diversity: Although a convenience sample was used, the study included participants from a variety of healthcare facilities, which increased the diversity of the sample and minimized the risk of selection bias.
- Online data collection procedure: Surveys were made available exclusively to groups dedicated to nurses, with membership verified based on possession of a valid nursing license. This ensured that only authorized individuals could participate in the study, effectively eliminating the participation of unauthorized persons.
- Strict inclusion and exclusion criteria: To ensure the reliability of the data, strict inclusion and exclusion criteria were applied to participants, and any incomplete or incorrect answers were excluded from the analysis.

Instruments

The study was conducted using the survey method. The questionnaire consisted of two parts: the first one collected socio-demographic data of the nurses (age, gender, years of work experience, education, workplace with indication of the type of department), the second part of the survey comprised a standardized, validated Expanded Nursing Stress Scale (ENSS) questionnaire [26], for which prior permission was obtained from the author of the scale. The ENSS scale was specifically designed for the nursing profession and has been validated for use in various contexts. Its widespread application in numerous countries indicates its effectiveness and reliability as a research tool for assessing stress levels among nurses (Cronbach's alpha 0.96) [26–28]. The ENSS questionnaire has been validated and linguistically and culturally adapted in Poland and Lithuania, demonstrating its reliability and suitability as a research tool. This provided confidence that the questionnaire is both comprehensible and effective in measuring stress levels within Polish and Lithuanian contexts. The reliability of the Polish version of the scale has been evaluated using Cronbach's alpha and McDonald's omega coefficients, which were 0.89 and 0.91, respectively [29]. The validity and reliability of the Lithuanian version were also evident, with Cronbach's alphas ranging from 0.64 to 0.87 [30]. The ENSS scale consists of 57 statements, divided into nine subscales. The ENSS questionnaire allows for assessing the intensity of general stress related to the work performed and the level of stress related to a specific area of nurses' work – 9 subscales). Each of the subscales of the questionnaire consists of a different number of questions. Therefore, each scale has a different range of values. However, on each of them, a higher number of points means greater stress. However, for each of the subscales, the average number of points per question was calculated and interpreted according to the key to a single question. The total stress score is the sum of the points from all items on the scale. However, the stress level in individual subscales is the sum of the points from the statements assigned to a given subscale [26].

The nine subscales that emerged, and the items in each subscale are as follows:

- death and dying: items 1,9,17,27,37,47, 53;
- conflict with physicians: items 2, 10, 28, 38, 48;
- inadequate preparation: items 3, 11, 19;
- problems with peers: items 4, 12, 20, 21, 22, 50;
- problems with supervisors: items 5, 30, 31, 40, 46, 49, 54;
- workload: items 13, 23, 32, 41, 42, 45, 51, 55, 57:
- uncertainty concerning treatment: items 6, 14, 18, 24, 29, 33, 36, 39, 43;
- patients and their families: items 7, 15, 25, 34, 35, 44, 52, 56;
- discrimination: items 8, 16, 26 [26].

The ENSS questionnaire is scored on a five-point scale, where:

- 0 indicates that the situation does not apply to the participant,
- 1 indicates that the situation was never stressful,
- 2 indicates that the situation was occasionally stressful,
- 3 indicates that the situation was often stressful, and.
- 4 indicates that the situation was extremely stressful.

To calculate the total stress score, the scores from all 57 items are summed. For measuring stress in specific areas, the scores of the relevant items within each subscale are aggregated. For each of the nine subscales, the average score per item was calculated, which allows for an assessment of stress levels in distinct aspects of nurses' work. A higher score reflects a higher level of stress, both in terms

of the overall score and in specific subscales. The total stress score represents the cumulative sum of the points across all items.

Each item is scored such that a higher value indicates a greater frequency of stress within that subscale. (the full version of the questionnaire is available as Supplementary material - Appendix 1).

Statistical methods applied

The analysis was performed using R software, version 4.4.0 [31]. Mean, standard deviation, median, quartiles, and range were presented for quantitative variables. For qualitative variables, absolute and relative frequencies (N and %) were reported. The Mann-Whitney test was used for comparisons of quantitative variables between two groups, while the Kruskal-Wallis test (followed by the post-hoc Dunn test) was used for comparisons among three or more groups. A significance level of 0.05 was adopted for the analysis. Additionally, the effect size was calculated. For comparisons between two groups, the effect size "r" (Pearson's correlation coefficient) was computed with the following criteria: $r < 0.3$ indicates a weak effect, r from 0.3 to 0.5 indicates a medium effect, and $r > 0.5$ indicates a strong effect. When comparing more than two groups, the "η^2" effect size (eta-squared) was calculated with the following interpretation: $\eta^2 < 0.06$ indicates a weak effect, η^2 from 0.06 to 0.14 indicates a medium effect, and $\eta^2 > 0.14$ indicates a strong effect.

Results

Characteristics of the study group, divided into Polish and Lithuanian nurses

A total of 862 nurses participated in the study, including 380 nurses from Lithuania and 482 nurses from Poland. The average age of Polish nurses was higher compared to Lithuanian nurses. In the Polish study group, the percentage of men was higher than in the Lithuanian group. Work experience as a nurse was longer among Lithuanian nurses compared to Polish nurses. Most nurses from Poland worked in hospitals and long-term care facilities (e.g., nursing home, hospice), while nurses from Lithuania predominantly worked in primary care. The level of education was higher among nurses from Poland than among those from Lithuania. The percentage of nurses in managerial positions was higher among Lithuanian nurses compared to Polish nurses, whereas the percentage of nurses working night shifts was higher among Polish nurses than their Lithuanian counterparts. Additionally, the majority of Polish nurses worked full-time, while the percentage of nurses working part-time and holding more than one full-time job was higher among Lithuanian nurses. Detailed characteristics of the study group are presented in Table 1.

The high average value and wide range of ENSS scores indicate a significant burden of stress among nurses. The highest levels of stress are associated with workload, uncertainty regarding treatment, and interactions with patients and their families. These findings underscore the necessity of implementing effective stress management and support strategies for this professional group. The healthcare system should focus particularly on these areas to enhance nurses' working conditions and their mental and physical health (Table 2).

The results of the stress levels divided between Lithuanian and Polish nurses showed that the overall stress level (ENSS total score), as well as scores across all analyzed subscales, were significantly higher among Lithuanian nurses compared to Polish nurses. The results of individual scales are presented in Table 3; Fig. 1.

The results showed that statistically significant factors influencing the level of stress among nurses in Lithuania are age and place of work while in Poland gender, seniority, education, shift work, and workload were important (Table 4). Detailed results of all variables included in the analysis are available in the Supplementary material – Appendix 2.

Discussion

The profession of nursing is inherently associated with high levels of stress due to intense professional demands, frequent crises, and the responsibility for the life and health of patients. These elevated stress levels can result in burnout, which adversely affects the quality of healthcare and the mental and physical well-being of nurses. Nursing responsibilities vary significantly across different healthcare settings: primary care, hospice care, and hospitals, reflecting the distinct needs of patients in each environment [32, 33]. In primary care, nurses often serve as patient advocates, conducting routine assessments, managing chronic conditions, and providing education on prevention and wellness. Their lower nurse-patient ratios allow for more personalized care and follow-up [34]. In hospice care, nurses focus on palliative measures, emphasizing comfort and quality of life. They manage pain and coordinate end-of-life care, often developing close relationships with patients and families [35]. Hospital nurses address acute medical issues, administering medications and performing complex procedures. In this setting, the higher nurse-patient ratios necessitate quick decision-making and prioritization of care [36]. Understanding these differences underscores how the nursing role adapts to patient needs, impacting both care quality and nurses' mental well-being across diverse environments. This study aims to assess work-related stress among nurses in Poland and Lithuania, taking into account the geopolitical circumstances of these countries.

Table 1 Characteristic of study group ($n = 862$)

Parameter		Country			*p*
		Lithuania ($N = 380$)	Poland ($N = 482$)	Total ($N = 862$)	
Age	Up to 25	56 (14.74%)	150 (31.12%)	206 (23.90%)	$p < 0.001$ *
	26–35	86 (22.63%)	71 (14.73%)	157 (18.21%)	
	36–45	43 (11.32%)	97 (20.12%)	140 (16.24%)	
	46–55	122 (32.11%)	144 (29.88%)	266 (30.86%)	
	56–60	43 (11.32%)	14 (2.90%)	57 (6.61%)	
	Over 60	30 (7.89%)	6 (1.24%)	36 (4.18%)	
Gender	Female	370 (97.37%)	421 (87.34%)	791 (91.76%)	$p < 0.001$ *
	Male	10 (2.63%)	61 (12.66%)	71 (8.24%)	
Work experience as a nurse (since obtaining licensure; right to practice)	Up to 5 years	115 (30.26%)	216 (44.81%)	331 (38.40%)	$p < 0.001$ *
	6–10 years	47 (12.37%)	39 (8.09%)	86 (9.98%)	
	11–15 years	18 (4.74%)	43 (8.92%)	61 (7.08%)	
	16–20 years	23 (6.05%)	32 (6.64%)	55 (6.38%)	
	21–25 years	16 (4.21%)	26 (5.39%)	42 (4.87%)	
	26–30 years	46 (12.11%)	70 (14.52%)	116 (13.46%)	
	Over 30 years	115 (30.26%)	56 (11.62%)	171 (19.84%)	
Workplace	Primary/Health Care Center	100 (26.32%)	92 (19.09%)	192 (22.27%)	$p = 0.002$ *
	Nursing home/long-term care/ hospice	25 (6.58%)	60 (12.45%)	85 (9.86%)	
	Hospital	255 (67.11%)	330 (68.46%)	585 (67.87%)	
Education	Diploma	127 (33.42%)	22 (4.56%)	149 (17.29%)	$p < 0.001$ *
	Bachelor	198 (52.11%)	326 (67.63%)	524 (60.79%)	
	MSc or PhD	55 (14.47%)	134 (27.80%)	189 (21.93%)	
Held position	Registered nurse	335 (88.16%)	463 (96.06%)	798 (92.58%)	$p < 0.001$ *
	Head-nurse	45 (11.84%)	19 (3.94%)	64 (7.42%)	
Shift work and night duty	Yes	216 (56.84%)	322 (66.80%)	538 (62.41%)	$p = 0.003$ *
	No	164 (43.16%)	160 (33.20%)	324 (37.59%)	
Workload	Full-time job	233 (61.32%)	407 (84.44%)	640 (74.25%)	$p < 0.001$ *
	Part-time job	20 (5.26%)	22 (4.56%)	42 (4.87%)	
	Two or more full-time positions simultaneously	127 (33.42%)	53 (11.00%)	180 (20.88%)	

p - chi-squared or Fisher's exact test

* Statistically significant ($p < 0.05$)

Table 2 Assessment of the stress level divided into subscales - total results of Polish and Lithuanian nurses

ENSS	*N*	Value Range	Mean	SD	Points per question	Median	Min	Max	Q1	Q3
Death and Dying	847	7–28	19,15	5,77	2,74	19	7	35	15	23,00
Conflict with physicians	844	5–20	13,61	4,15	2,72	13	5	25	10	16,00
Inadequate preparation	845	3–12	7,54	2,28	2,51	7	3	15	6	9,00
Problems with peers	844	6–24	15,09	4,98	2,52	14	6	30	11	19,00
Problems with supervisors	845	7–28	18,52	5,75	2,65	18	7	35	14	22,00
Workload	845	9–36	25,21	6,43	2,80	25	9	45	21	30,00
Uncertainty concerning treatment	847	9–36	24,12	6,68	2,68	24	9	45	19	29,00
Patients and their families	847	8–32	22,88	6,19	2,86	23	8	40	18	27,00
Discrimination	844	3–12	8,50	4,72	2,83	8	3	15	4	13,25
ENSS Total	848	57–228	154,65	38,06	2,71	154	57	281	126	181,25

Work-related stress is a significant public health issue affecting numerous professions [37]. According to the World Health Organization (WHO), work-related stress is a prevalent phenomenon with both health and financial implications [2]. The consequences of stress are multifaceted, impacting psychophysical health and imposing a substantial economic burden. In addition to the costs associated with treating the effects of stress, comprehensive data on the overall costs related to workplace stress remains limited [37, 38]. A narrative review by Shaholli et al. indicates that work-related stress imposes a substantial financial burden on societies globally, with estimated

Table 3 Assessment of the stress level divided into subscales - comparison between Lithuanian and Polish nurses

ENSS	Country	*N*	Mean	SD	Median	Min	Max	Q1	Q3	*p*
Death and Dying	Lithuania	366	20,57	6,22	21	7	35,00	16	25,0	$p<0.001$ *
	Poland	481	18,07	5,15	17	7	35,00	15	21,0	$r=0,255$
Conflict with physicians	Lithuania	363	15,22	4,03	15	5	24,00	12	18,0	$p<0.001$ *
	Poland	481	12,39	3,81	12	5	25,00	10	15,0	$r=0,372$
Inadequate preparation	Lithuania	364	7,83	2,49	8	3	15,00	6	9,0	$p=0.001$ *
	Poland	481	7,32	2,09	7	3	15,00	6	8,0	$r=0,14$
Problems with peers	Lithuania	363	16,28	5,10	16	6	30,00	12	20,0	$p<0.001$ *
	Poland	481	14,18	4,70	13	6	30,00	11	17,0	$r=0,242$
Problems with supervisors	Lithuania	364	19,88	5,81	20	7	35,00	16	24,0	$p<0.001$ *
	Poland	481	17,50	5,49	17	7	35,00	14	21,0	$r=0,239$
Workload	Lithuania	364	26,57	6,69	27	9	45,00	22	31,0	$p<0.001$ *
	Poland	481	24,18	6,03	24	10	43,00	20	28,0	$r=0,223$
Uncertainty concerning treatment	Lithuania	366	26,32	6,82	27	9	42,00	22	31,0	$p<0.001$ *
	Poland	481	22,45	6,07	22	9	45,00	18	27,0	$r=0,32$
Patients and their families	Lithuania	366	24,96	6,36	25	8	40,00	21	30,0	$p<0.001$ *
	Poland	481	21,30	5,57	21	9	39,00	17	25,0	$r=0,334$
Discrimination	Lithuania	363	10,85	4,60	12	3	15,00	7	15,0	$p<0.001$ *
	Poland	481	6,72	3,97	5	3	15,00	3	10,0	$r=0,439$
ENSS Total	Lithuania	367	168,44	38,56	172	57	274,64	145	195,5	$p<0.001$ *
	Poland	481	144,13	34,15	141	66	281,00	120	166,0	$r=0,36$

p - Mann-Whitney test, SD - standard deviation, Q1 - lower quartile, Q3 - upper quartile, r -Pearson's correlation coefficient *Statistically significant ($p<0.05$. Min and Max indicate the characteristics of the sample. Min represents the lowest value among the nurses included in the analysis, not the lowest possible value

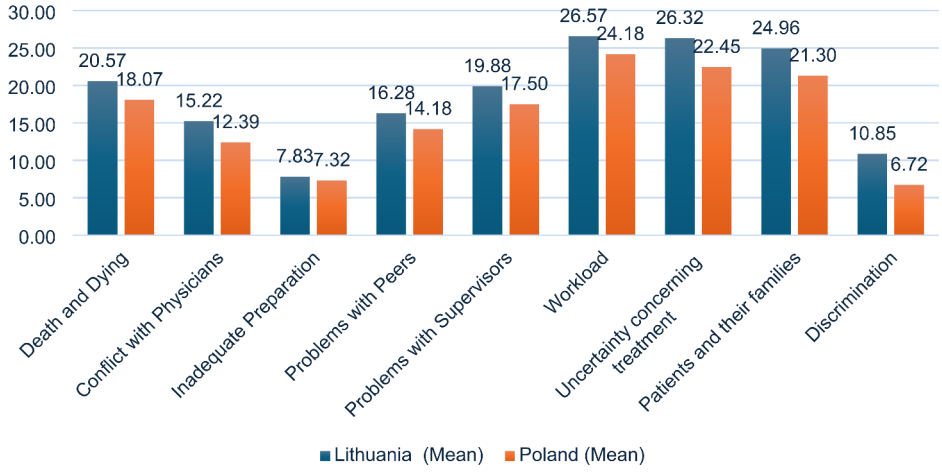

Fig. 1 Comparison of stress levels among Lithuanian and Polish nurses

costs ranging from €54 million to €280 billion, varying by country. The findings suggest that productivity losses due to absenteeism and presenteeism have a more significant economic impact compared to medical expenses [37]. Consequently, the costs of work-related stress are borne by both employers and healthcare systems [37]. Furthermore, the American Institute of Stress reports that stress is the primary cause of 80% of all work-related injuries and 40% of workplace turnover [39]. The high demands of the nursing profession, combined with the responsibility for human life and health, are frequently cited as major sources of stress in this field [40]. Occupational stress can markedly affect a nurse's quality of life and, concurrently, reduce the quality of care. Nursing care is an interpersonal procedure characterized by specialized care, interpersonal sensitivity, and intimate relationships, including positive communication and the application of professional knowledge and skills [41]. Work-related stress diminishes compassion for patients and increases the incidence of practice errors, thereby negatively impacting the quality of care [41]. Numerous studies indicate that this stress has a direct or indirect impact on care delivery and treatment outcomes [42]. Additionally, the ongoing war in the region has significantly heightened

Table 4 Statistically significant factors influencing the level of stress among Lithuanian and Polish nurses (ENSS)

ENSS	Age	*N*	Mean	SD	Me	Min	Max	Q1	Q3	*p*
Age – Lithuania*										
ENSS Total	Up to 25 - A	52	175,90	42,39	184,50	57	234,22	148,00	209,76	$p=0.049$ *
	26–35 - B	82	173,91	35,20	177,50	69	245,00	160,00	200,00	A > D, C B > D
	36–45 - C	43	162,67	37,93	165,91	69	251,00	139,00	187,29	$\eta^2 = 0{,}016$
	46–55 - D	120	162,75	39,54	168,00	57	274,64	137,75	187,00	
	56–60 - E	41	166,43	36,23	169,00	57	228,00	145,55	193,00	
	Over 60 - F	29	174,48	38,46	184,00	61	228,00	163,00	199,50	
Workplace – Lithuania*										
ENSS Total	Primary/Health Care Center - A	95	175,77	42,30	184,00	57	251,00	152,50	206,82	$p=0.026$ *
	Nursing home/long-term care/hospice - B	24	169,71	51,64	182,50	69	274,64	135,56	207,92	A > C
	Hospital - C	248	165,50	35,28	169,99	57	238,00	143,75	190,25	$\eta^2 = 0{,}014$
Gender – Poland**										
ENSS Total	Female	420	145,52	34,52	143,5	66	281	120	168	$p=0.034$ *
	Male	61	134,51	30,02	136,0	71	209	119	151	$r=0{,}098$
Work experience as a nurse – Poland*										
ENSS Total	Up to 5 years - A	215	142,49	34,15	139,0	71	244,00	119,50	166,00	$p=0.002$ *
	6–10 years - B	39	148,38	35,50	155,0	66	192,00	125,00	179,00	D, C > A, F B, G, A > F
	11–15 years - C	43	155,63	31,68	151,0	105	231,00	136,00	163,00	$\eta^2 = 0{,}031$
	16–20 years - D	32	157,12	34,30	160,0	87	214,00	137,75	178,50	
	21–25 years - E	26	149,08	49,80	139,0	91	281,00	116,00	165,00	
	26–30 years - F	70	132,47	28,83	128,0	71	190,34	111,50	157,75	
	Over 30 years - G	56	143,46	27,55	145,0	78	187,00	122,00	166,25	
Education – Poland*										
ENSS Total	Diploma - A	22	149,55	30,40	148	78	199	141,75	168,50	$p=0.01$ *
	Bachelor - B	325	141,04	34,65	139	66	244	117,00	165,00	C > B
	MSc or PhD - C	134	150,73	32,66	147	96	281	125,00	172,75	$\eta^2 = 0{,}015$
Shift work and night duty – Poland**										
ENSS Total	Yes	321	140,88	33,25	139	66	244	119,00	163,0	$p=0.004$ *
	No	160	150,64	35,09	152	74	281	125,00	172,5	$r=0{,}129$
Workload – Poland*										
ENSS Total	Full-time job - A	407	141,32	31,93	139,0	66	234	118,00	166,00	$p=0.001$ *
	Part-time job - B	22	149,91	34,50	157,5	91	214	130,00	169,75	C > A
	More than one full-time job - C	52	163,65	43,64	153,0	71	281	139,25	184,50	$\eta^2 = 0{,}025$

*p - Kruskal-Wallis's test + posthoc analysis (Dunn test), SD - standard deviation, Q1 - lower quartile, Q3 - upper quartile

* Statistically significant ($p < 0.05$)

** p - Mann-Whitney test, SD - standard deviation, Q1 - lower quartile, Q3 - upper quartile;

η^2 - effect size (eta-squared);

* Statistically significant ($p < 0.05$)

the demands on nurses. The number of patients, particularly refugees, has increased, introducing additional challenges related to language barriers and cultural differences [16, 18].

Th findings show that both, Lithuanian and Polish nurses experience significant levels of stress in their professional roles, as indicated by the overall ENSS scores. However, the results clearly show that Lithuanian nurses report higher levels of stress compared to Polish nurses across almost all measured subscales. The total ENSS score for Lithuanian nurses was 168.44, whereas for Polish nurses it was 144.13 ($p < 0.001$), indicating that Lithuanian nurses generally face more work-related stress. When examining specific subscales, Lithuanian nurses consistently experienced higher stress levels. For example, in the "Workload" subscale, Lithuanian nurses scored 26.57 compared to 24.18 for Polish nurses ($p < 0.001$). In the "Uncertainty concerning treatment" subscale, Lithuanian nurses had a score of 26.32, while Polish nurses scored 22.45 ($p < 0.001$). Lithuanian nurses also reported higher stress in the "Patients and their families" subscale (24.96 versus 21.30 for Polish nurses, $p < 0.001$). Additionally, Lithuanian nurses scored higher in the "Problems with supervisors" subscale (19.88 compared to 17.50 for Polish nurses, $p < 0.001$), reflecting more difficulties in relationships with superiors. There is a considerable amount of research indicating that excessive workload, particularly in care-related professions like nursing,

leads to burnout and higher levels of stress. Overwork, including a high patient-to-staff ratio, can significantly increase the perception of stress [43, 44]. According to a systematic review conducted by Alsadaan et al., management style and relationships with supervisors also have a substantial impact on nurses' work-related stress. Supervisors who fail to support their employees or create a negative work environment can contribute to higher stress levels among staff [45]. In addition, uncertainties in nursing practice, particularly concerning medical decisions that affect patient health can further elevate stress levels. Nurses may experience stress due to a lack of clear guidelines or the need to make difficult treatment decisions [46]. Furthermore, the need for interaction and confrontation with patients and their families is a significant aspect of nursing work. The complexity of these relationships and the emotions involved can lead to increased stress in this role [47, 48].

Additionally, both Polish and Lithuanian nurses experienced lower stress levels in some subscales, particularly in the "Discrimination" and "Inadequate preparation" subscales. In the "Discrimination" subscale, Lithuanian nurses reported a score of 10.85, while Polish nurses had a significantly lower score of 6.72 ($p < 0.001$). Similarly, in the "Inadequate preparation" subscale, both groups experienced relatively low stress, with Lithuanian nurses scoring 7.83 and Polish nurses 7.32 ($p = 0.001$). This suggests that nurses see themselves as professionals, with their education and experience providing confidence and independence [49]. The increased prestige of the nursing profession in recent years likely contributes to this perception, reflecting greater recognition of their expertise [50]. It also indicates that current nursing education helps nurses effectively handle professional challenges, including discrimination and inadequate preparation [51, 52].

Moreover, the ongoing geopolitical conflict, notably the war in Ukraine, has intensified the stress levels due to an influx of refugees, which has exacerbated existing challenges [53]. It is aligned with existing literature that highlights the pervasive issue of work-related stress in nursing, particularly in the context of crises, such as the ongoing war in Ukraine [54]. This study confirms these patterns within the specific geopolitical context of Poland and Lithuania but also highlights the unique challenges posed by the influx of refugees and accompanying language and cultural barriers. The healthcare system should prioritize these areas to enhance nurses' working conditions and their mental and physical health.

Various studies worldwide corroborate the significant stress levels among nurses. A study in public hospitals in Addis Ababa revealed that 47.8% of nurses experience occupational stress [55]. Work-related stress among nurses is a global issue [55]. A study in the USA found that 93% of nurses suffer from high-stress levels. In China, nurses reported high professional stress, according to a study by Yang et al. [56] and in Slovenia [57]. This study revealed significant differences in stress levels across various subscales between nurses in Poland and Lithuania, with higher stress levels consistently observed among Lithuanian nurses. In my opinion the proximity to the conflict zone and the high number of refugees can affect this. A study by Kavaliauskas et al. found an average stress level among Lithuanian nurses [58]; however, both demands and workloads have increased considerably since then. The comparison of stress levels between nurses in Poland and Lithuania is consistent with the results of previous studies, where stress levels were influenced by national and regional factors. The COVID-19 pandemic, in particular, placed an unprecedented burden on healthcare workers, especially nurses, exacerbating work-related stress levels [59]. Research by the Medical Universities indicated that 88% of Polish nurses experience severe symptoms of occupational stress, further intensified by the pandemic [60]. The most significant differences in this study were observed in scales related to conflicts with doctors, issues with colleagues, workload, uncertainty about treatment, and discrimination. A study in Jeddah, Saudi Arabia, also using the ENSS, found common high-stress levels, with workload and interpersonal problems as primary stressors [61]. Similarly, a Nigerian study indicated high-stress levels among nurses, particularly related to workload and patient relationships [62]. In Greece, Sarafis et al. identified significant stressors associated with dealing with death and dying and interactions with patients and their families [63]. This aligns with other studies where the most stressful aspect of nursing was coping with human suffering and the inability to prevent inevitable death [64]. Another major stressor is contact with patients and their families, which often involves a lack of cooperation and sometimes aggressive behaviors, including verbal and physical violence [65]. Moreover, the results showed that age and place of work were statistically significant factors influencing stress levels among nurses in Lithuania, whereas in Poland, gender, seniority, education, shift work, and workload were significant. These findings suggest that targeted interventions to reduce stress should consider these demographic and occupational variables. A study by Salam in Saudi Arabia analyzing the impact of these factors on stress levels among healthcare workers, including nurses, indicated that these factors significantly affect perceived stress levels. Younger workers experienced higher stress levels than older workers, while educational level was not statistically significant. Working long hours and in shifts causes higher levels of stress compared to employees working a regular single shift [66]. In this study, differences in stressors based on demographic

factors underscore the complexity of occupational stress. The unique geographical and cultural context of both countries may explain some of the observed differences in stress levels, highlighting the need for tailored interventions to address these disparities. An international comparative study published by the International Nursing Review highlighted significant differences in stress levels based on age, place of work, gender, length of service, education, shift work, and workload [67]. These factors can induce additional stress for healthcare workers, including nurses [68]. Additionally, the proximity of ongoing conflict adds to the psychological burden and stress levels among medical staff [69]. By identifying key stressors and contextualizing them within the current crisis, this study provides valuable insights into the specific challenges faced by nurses in regions affected by war and geopolitical tensions.

Strengths and limitations

The inclusion of a relatively large number of participants from two countries (Poland and Lithuania) and the use of a standardized and validated questionnaire enhance the reliability and representativeness of the results. This diversity in the sample allows for a deeper understanding of the factors influencing occupational stress among nurses in these two contexts, contributing valuable insights into the challenges faced by this profession. However, there are several limitations to consider when interpreting the study results. The cross-sectional design of the study means that causality cannot be drawn, as the study only identifies correlations between variables. Stress was assessed using self-report questionnaires, which may introduce subjectivity and be influenced by personality traits, potentially skewing the responses. Additionally, the study sample was limited to nurses from Poland and Lithuania, which may reduce the generalizability of the findings to other populations. Furthermore, the study did not account for all potential external factors influencing stress levels, such as varying working conditions across different hospitals or individual social support mechanisms available to nurses. Another limitation is the use of an online questionnaire as a data collection method, which may have excluded participants who were less familiar with technology or had limited internet access. Lastly, the study did not conduct a pilot phase but relied on validation conducted by other researchers.

Conclusions

Stress significantly impacts the quality of life of nurses, leading to burnout, health problems, and reduced life satisfaction. High-stress levels not only affect nurses' well-being but also compromise patient care, resulting in medical errors, diminished communication. with patients. The study highlights a significant burden of stress among nurses, particularly in Lithuania, with primary influencing factors being age and workplace location. In Poland, gender, length of service, education, shift work, and workload are the main stressors. To address these challenges, it is essential to prioritize psychological support and stress management programs in the daily work of nurses. Such initiatives should include regular access to mental health resources, peer support, and training to develop coping skills for managing workplace challenges. Additionally, given the current geopolitical situation, it is crucial to enhance social support mechanisms, including adequate staffing and structured breaks, to foster a healthier work environment.

Implications for practice and future research directions

The findings underscore the urgent need for actionable strategies to address staffing shortages, improve working conditions, and ensure adequate mental health support for nurses. Policymakers and healthcare administrators should prioritize the implementation of policies that ensure safe nurse-patient ratios, reasonable working hours, and access to mental health resources. Developing structured programs that integrate psychological support into nursing practice, such as regular mental health screenings, counseling services, and peer support networks, is critical for reducing stress and burnout rates. Additionally, improving work environments by promoting flexibility and better work-life balance can significantly contribute to nurses' well-being, thereby enhancing the overall quality of care for patients.

Another key aspect to address is the language barrier, particularly in multicultural and multilingual healthcare settings. Offering language courses for nurses and providing access to professional interpreters and translators could significantly improve communication with patients, enhance cultural competence, and reduce stress. Incorporating language support services within the healthcare system is crucial for fostering a more inclusive and efficient care environment, especially in areas with a high proportion of non-native speakers. This could include training programs to help nurses acquire key medical vocabulary in different languages, as well as providing on-demand access to translators or language technology during patient interactions.

Future research should focus on evaluating the effectiveness of specific stress-reduction interventions tailored to the nursing profession, particularly in regions experiencing geopolitical tensions. Studies should assess the impact of mindfulness programs, resilience training, and other stress management techniques on nurse well-being and performance. Additionally, research on multicultural competency training is essential, as nurses often care for patients from diverse cultural backgrounds. Investigating how such training can improve

communication, reduce misunderstandings, and alleviate stress among nurses could offer valuable insights into enhancing patient care. Longitudinal studies examining the sustained impact of interventions on nurse well-being and patient outcomes would be valuable. Furthermore, research into organizational culture and its role in shaping stress levels should explore how leadership styles and support systems can positively influence the nursing workforce. Cross-cultural studies are needed to explore stressors and coping mechanisms in different regions, with a view to developing culturally appropriate support strategies for nurses globally.

Supplementary Information

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Supplementary Material 1

Supplementary Material 2

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Data availability
All data generated or analyzed during this study has been included in this published article (and its additional file).

Declarations

Ethics approval and consent to participate
The study adhered to the principles outlined in the Declaration of Helsinki and approved by the Bioethics Commission of the University of Information Technology and Management in Rzeszow, Poland (Resolution No. 2023/2, dated June 28, 2023). Before starting the study, survey participants were informed about its content and the voluntary nature of their participation, as well as about the possibility of resigning from participation in the study at any stage. Informed consent was obtained from all participants.

Consent for publication
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Competing interests
The authors declare no competing interests.

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