

Original Article

Assessment of Pediatric Oncology Nurses' Occupational Stress: A Comparative Study

Eleni Lioka, MSc(c)

School of Medicine, School of Health Sciences, National and Kapodistrian University of Athens, Athens, Greece

Maria Moschovi, MD, PhD

Associate Professor, School of Medicine, School of Health Sciences, National and Kapodistrian University of Athens, 1st Pediatric Clinic, Athens, Greece

Ioannis Koutelekos, RN, PhD

Assistant Professor, Department of Nursing, Faculty of Health and Care Sciences, University of West Attica, Athens, Greece

Margarita Baka, MD, PhD

Head of the Department of Oncology, Oncology Pediatric Hospital Marianna V. Vardinogianni - Elpida, Athens, Greece

Sophia Polychronopoulou, MD, PhD

Head of the Department of Pediatric Hematology/Oncology, "Aghia Sophia" Children's Hospital, Athens, Greece

Konstantinos Petsios, MHSc, MHM, PhD

Research Unit, Onassis Cardiac Surgery Center, Athens, Greece

Evangelos Dousis, RN, PhD

Associate Professor, Department of Nursing, Faculty of Health and Care Sciences, University of West Attica, Athens, Greece

Name and the postal address of the place where the work was carried out: MSc "General Pediatrics and Pediatric Subspecialties: Clinical Practice and Research", School of Medicine, School of Health Sciences, National and Kapodistrian University of Athens, Athens, Greece, msc-pediatrics@med.uoa.gr

Correspondence: Evangelos Dousis, Koumoundourou 130, Pireas, 18544, Athens, Greece. E-mail: edousis@uniwa.gr

Abstract

Background: Pediatric oncology nurses (PONs) present higher levels of occupational stress (OS) related to the nature of the care they provide, along with the extreme workload and the emotional distress related to the loss of a patient.

Aim: The aim of this study was to assess the level of OS that PONs experience in Greece in comparison to the stress experienced by general pediatric nurses (PNs).

Methodology: This is a non-invasive comparative cross-sectional study. We assessed the stress level in a sample of 60 PNs and 60 PONs, working in the two biggest pediatric public hospitals in Greece, using the Nurse Stress Scale (NSS). The self-reported stress levels among these groups were compared. X² test and t-test were used to investigate the relationship between variables. The significance level was set at 0.05.

Results: In all NSS' subscales PONs stated higher levels of stress in comparison to PNs, but this was statistically significant only in the death & suffering (p = 0.033) and lack of staff support subscales (p = 0.027). The majority of PNs are experiencing occasional OS on almost all NSS questions. Workload, death & suffering, conflicts with other nurses and supervisors, with medical staff, treatment uncertainty were noted as particularly stressful factors in both groups.

Conclusions: PONs experience greater stress than PNs, but more evidence is needed to support the hypothesis and reveal the related factors. However, younger age, exposure to patients' death and suffering, lack of support from colleagues seem to be the core determinants related to PONs stress.

Keywords: Pediatric nursing, Oncology nursing, Occupational stress, Personnel Staffing and Scheduling

Introduction

Pediatric Oncology Nurses (PONs) provide nursing care to children with cancer and assist their family members to cope, in all phases, from diagnosis to cure or death, and they have to deal with any complications and the multidimensional needs of both children and their families (Heckman, 2012). In literature, there is a number of studies reporting that PONs, mainly due to the nature of their work, they may experience intense stress (Heckman, 2012), moral distress, burnout (Ventovaara et al., 2021), grief (Conte, 2014), compassion fatigue, emotional exhaustion (Heckman, 2012; la Fuente-Solana et al., 2020; Sullivan et al., 2019) and even vicarious traumatization (Cherven, et al., 2020).

Pediatric nurses working in high complexity children's departments, such as oncology clinics, state that in order to provide adequate family centered care they have to develop a close therapeutic relationship with the small patients and their families, even if they try to suppress the emotional bonding, and that may cause emotional exhaustion, feeling of weakness and less personal achievement (Vega Vega et al., 2015; Borhani et al., 2013; Enskär, 2012). Interventions and strategies that enhance nurses' professional commitment and nurse-patient connectedness may contribute positively to limit the effect of these stressors (Cherven et al., 2020).

Moreover, PONs commonly provide care to patients with end stage disease in patients with critical condition due to the state of disease or complications, by creating an environment with minimal time for self-reflection. Dealing with life threatening situations and poor prognosis is part of the everyday practice when caring with children with cancer and nurses have a key role not only in providing care to the sick child but also in supporting the emotional needs of the family (Heckman, 2012). However, this mean that PONs are consistently exposed to traumatic experiences, and thus, they may also experience secondary traumatic stress (Perry et al., 2011). In addition, PONs may feel disappointment and powerlessness when the patients they provide care are not responding to the therapy or have no chance to recover. In such cases they usually develop negative feelings and occupational stress (OS) that in some cases is related but not limited to, psychological illnesses such as depression and anxiety and occurrence of physical symptoms such as headaches, gastrointestinal disorders, hypertension and increased fatigue (Isikhan, Comez & Danis, 2004; Papadatou, 2001).

In a recent review and a research paper was reported that almost 3 in 4 oncology nurses report severe OS (Ko & Kiser-Larson, 2016) due to workload, mourning and death, inadequate preparation, conflict with physicians, uncertainty about treatment, conflict with other nurses and lack of support (Ko & Kiser-Larson, 2016; Naholi, Nosek & Somayaji, 2015). Other factors that contribute to the

occurrence of OS in PONs are age, work experience and marital status, increased role responsibilities, long and tedious working hours, lack of time for socialization and the problems faced by patients and their families (Isikhan, Comez & Danis, 2004).

The management of children with cancer and their families can be a major cause of burnout and OS. PNs and PONs have to deal with children having difficult treatment/recovery trajectories, deal with the emotional burdens of the patients and their families and cope with the death of their patients. Moreover, PNs have a professional culture of limiting their complains and "stand up" for all patients under any circumstances (Spinetta et al., 2000). Nurses experiencing recurring pain, suffering and death of children may begin to feel out of control. This can lead them feeling that life is not fair, resulting in conflicts with personal values and ethical challenges. The most commonly used mechanisms by PNs and PONs to deal with work stress are spirituality and peer support. Although pediatric oncologists mourn their patients during treatment and even after death, there are currently no standard guidelines for clinical interventions aimed at reducing the effects of the stress response on them (Davis, Lind & Sorensen, 2013).

Even physiological and psychological resilience of PONs is investigated as a factor that can affect stress (Cherven et al., 2020; Zander, Hutton & King, 2010), they report satisfied with their profession (Enskär, 2012) and a higher sense of personal accomplishments than PNs working in other departments (Naholi, Nosek & Somayaji, 2015). As stress in PONs has not been adequately studied in Greece such as in other Balkan or Southern European countries (Naholi, Nosek & Somayaji, 2015; Conte, 2011), the purpose of this study was to assess the level of their stress in comparison to the stress experienced by PNs.

Materials and Methods – Study design

This is a non-invasive comparative cross-sectional study. The data was collected through self-reports from the participants. We recruited PNs and PONs (working in oncology departments or the bone marrow transplant unit) from the two main public pediatric hospitals in Greece (convenience sample), located in Attica and we assessed their stress. This study approved by the Research Ethics Committees of the Children's Hospitals (Ref. No: 7321/21-04-2021 and Ref. No: 20674/28-09-2020).

The participants were asked to participate in a voluntarily basis and after informed consent was obtained. All the nurses that were approached agreed to participate (100% response rate) and were asked to fill out the research form. A research team member remained at their disposal for any clarifications and gave them all the necessary time to complete them. At each stage of the study, participants retained the right to withdraw their participation. The research form included a form for demographics and the

NSS (Gray-Toft & Anderson, 1981). The study was conducted from January to June 2021 on a weekly basis.

In total, 120 nurses participated the study (60 PNs and 60 PONs) from two public pediatric hospitals of Athens.

The participants filled out a simple form with demographics including age, gender, marital status, number of children as well as educational level, previous working experience in a pediatric oncology department (years), total previous working experience (years), current placement and type of contract (permanent or fixed-term contract).

The NSS was designed as a survey instrument to evaluate nurses' stress (Gray-Toft & Anderson, 1981). The tool is consisted by 3 subscales divided in 7 factors, assessing nurses stress elements: The subscale "physical environment" (factor 6: workload), the subscale "psychological environment" (factor 1: death & suffering, factor 3: inadequate management of patients & family needs, factor 4: lack of staff support and factor 7: uncertainty of treatment) and the subscale "social environment" (factor 2: conflicts with medical staff & factor 5: conflicts with other nurses and supervisors).

The NSS uses a 4-point Likert scale for each item (never: 0, sometimes: 1, often: 2 and very often: 3). The total score ranges from 0 to 102. A higher score reflects a higher level of stress. The NSS was translated from the original English version to Greek and a group of experts (interviews and focus group in a two-step process) in pediatric nursing (clinical nurses and academics) evaluated its relevance, comprehensiveness, comprehensibility and level of adaptation to Greek culture. Then a reverse translation from Greek to English was performed. As there was no discrepancy, according to experts, between the Greek and English translations the questionnaire was accepted for pilot use. The pilot study was performed and led to minor changes and the scale was administered to study participants. Cronbach's alpha internal consistency coefficient for the overall NSS (N = 34) was $\alpha = 0.785$, indicating a high internal consistency of the questionnaire, while the Cronbach's alpha for each factor is shown in Table 1.

Statistical analysis: Descriptive techniques included the evaluation of frequency, mean, and standard deviation, median, amplitude, and interquartile range (IQR) for the continuous variables and frequency and percentage for the categorical ones. More specifically, the χ^2 test was used to investigate the relationship between two categorical variables. Student's t-test was used to investigate the relationship between a quantitative variable following the normal distribution and a bisector variable. The homogeneity of the dispersion between the compared samples was assessed with the Levene's test. Data analysis was performed with the statistical package SPSS v.26 at a level of statistical significance 0.05.

Results

The study involved 120 working nurses divided in a group of PONs (N = 60) and a group of PNs working in a non-oncology pediatric department (N = 60). The vast majority were female nurses (N = 112, 93.3%). More than one in two nurse were not married (N = 65, 54.2%) and the majority has no children yet (N = 77, 64.2%). The majority of the participants were young nurses with less than 5 years' experience (N = 56, 46.7%) and with a fixed-term contract (N = 63, 53.5%). They were all registered nurses and more than one in five had postgraduate studies (N = 26, 21.7%) (Table 2).

There was no statistically significant difference between the group of oncology and non-oncology nurses in terms of their demographic characteristics, despite the small differences observed.

Half of the nurses reported experiencing stress often or very often due to variety of reasons such as information system failure, when they are performing procedures that patients experience as painful, when they feel helpless in cases that a patient is not improving or suffers despite the provision of therapy and their interventions, as well as when their ward is understaffed, when there is a conflict with a colleague or there is an extreme workload and they have not enough time to provide emotional support to patients.

Additionally, a great number of the participants reported experiencing occasional stress on almost all NSS-scale questions. The psychological (Mean = 21.07, Median = 20.50, SD = 5.586), social (Mean = 11.29, Median = 11, SD = 3.475) and the physical environment (Mean = 9.17, Median = 9, SD = 3.011), were the most stressful factors for the participants in both groups.

The descriptive characteristics of the NSS subscales show that workload, death & suffering, conflicts with nurses and supervisors, conflicts with medical staff and treatment uncertainty were particularly stressful factors (Table 3).

Table 4 illustrates the correlations between the individual scores of the NSS with each other and with the overall score. The correlation was high in almost all the individual scores and especially in those that add up to the individual subscales. While the correlation with the overall score was statistically significant in all factors.

It was assessed whether nurses exhibit different levels of stress depending on the department in which they work. PONs stated higher scores of stress in comparison to PNs that were statistically significant differences in the death & suffering subscales ($t = 2.160$, $df = 118$, $p = 0.033$) and lack of staff support ($t = 2.243$, $df = 118$, $p = 0.027$). On the other hand, in the subscale regarding the uncertainty of treatment the PONs reported significantly lower scores ($t = -3.209$, $df = 118$, $p = 0.002$). In the other subscales and factors as well as in the overall score of the NSS no statistically significant difference was found between PONs and PNs.

Gender seems to have no direct effect in stress level since no significant association was found in any of the pediatric nursing groups. Also age was not significantly associated with the stress scores with the exception of the subscale regarding treatment uncertainty, in which the stress levels of younger nurses were higher compared to older nurses ($t = 2.321$, $df = 118$, $p = 0.022$).

Marital status and number of children was significantly related to certain NSS factor scores. More specifically, participants who had two or more children showed lower levels of stress compared to the other groups in the factors related to conflicts with medical staff ($p = 0.019$) and workload ($p = 0.035$).

The educational level of the nurses was also not found to have a significant effect on the self-reported level of stress of the nurses, regardless of the type of department they were working. Regarding the previous working experience, no statistically significant effect was found on the overall score or the individual subscales and factors of the NSS. An exception was the treatment uncertainty and the psychological environment in which participants with

longer working experience (> 15 years) showed lower levels of stress ($p = 0.001$ & $p = 0.046$, respectively).

The employment relationship was not significantly related to nurses' stress levels with the exception of the workload factor, with nurses with permanent employment reporting higher stress levels ($t = 2.254$, $df = 118$, $p = 0.026$).

The effect of the working experience in a pediatric oncology nursing ward on the stress levels of PONs ($N = 60$) was also investigated. It was found that in the overall score of the NSS as well as in its individual subscales and factors, the stress level decreased with the increase of previous working experience. More specifically, nurses with greater experience reported less stress level regarding inadequate management of patients & family needs ($t = -2.505$, $df = 47.852$, $p = 0.020$), lack of staff support ($t = -2.115$, $df = 58$, $p = 0.039$) and increased workload ($t = -3.371$, $df = 58$, $p = 0.001$). Moreover, nurses with higher clinical experience reported less stress in relevance to physical ($t = -3.371$, $df = 58$, $p = 0.001$) and psychological environment ($t = -2.361$, $df = 40.319$, $p = 0.023$).

Table 1. NSS Scale internal consistency control results

NSS subscales / Factors	Cronbach's α	Items
Physical environment	0.658	6
Factor 6: workload	0.658	6
Psychological environment		
Factor 1: death & suffering	0.679	7
Factor 3: inadequate management of patients & family needs	0.541	3
Factor 4: lack of staff support	0.559	3
Factor 7: uncertainty of treatment	0.528	5
Social environment		
Factor 2: conflicts with medical staff	0.630	5
Factor 5: conflicts with other nurses and supervisors	0.515	5
Total NSS score	0.785	34

Table 2. Demographic characteristics

Variables	Oncology Dep. (N = 60)	Non oncology Dep. (N = 60)	Total (N = 120)
Nurses gender			
Male	4 (6.7%)	4 (6.7%)	8 (6,7%)
Female	56 (93.3%)	56 (93.3%)	112 (93,3%)
Age (years)			
20-29	26 (43.3%)	16 (26.7%)	42 (35%)

30-39	16 (26.7%)	25 (41.7%)	41 (34.2%)
40-49	10 (16.7%)	13 (21.7%)	23 (19.2%)
50-59	8 (13.3%)	6 (10%)	14 (11.7%)
Marital status			
Married	12 (20%)	22 (36.7%)	34 (28.4%)
Single	38 (63.4%)	27 (44.9%)	65 (54.2%)
Divorced	5 (8.3%)	4 (6.7%)	9 (7.5%)
Cohabitation	5 (8.3%)	7 (11.7%)	12 (10%)
Number of children in the family			
None	43 (71.7%)	34 (56.7%)	77 (64.2%)
1	9 (15%)	9 (15%)	18 (15%)
2	8 (13.3%)	14 (23.3%)	22 (18.3%)
3	0	6 (5%)	3 (2.5%)
4 or more	0	0	0
Clinical pediatric oncology nursing experience (years)			
None	0	60 (100%)	60 (50%)
<5	33 (55%)	0	33 (26.5%)
6-10	9 (15%)	0	9 (7.5%)
11-15	5 (8.3%)	0	5 (4.2%)
>15	13 (21.7%)	0	13 (10.8%)
Total clinical experience (years)			
<5	27 (45%)	29 (48.3%)	56 (46.7%)
6-10	8 (13.3%)	10 (16.7%)	18 (15%)
11-15	11 (18.3%)	10 (16.7%)	21 (17.5%)
>15	14 (23.3%)	11 (18.3%)	25 (20.8%)
Educational level			
Undergraduate	43 (71.7%)	51 (85%)	94 (78.3%)
Postgraduate (MSc)	15 (25%)	9 (15%)	24 (20%)
Postgraduate (PhD)	2 (3.3%)	0	2 (1.7%)
Employment contract type			
Indefinite time (Permanent employee)	32 (53.3%)	25 (41.7%)	57 (47.5%)
Fixed time (Non-permanent employee)	28 (46.7%)	35 (58.3%)	63 (52.5%)

Table 3. Descriptive characteristics of NSS subscales

Variables	Total nurses (N = 120)		PONs (N = 60)		PNs (N = 60)	
	Mean (SD)	Median (IQR)	Mean (SD)	Median (IQR)	Mean (SD)	Median (IQR)
Factor 1	8.46 (2.789)	8.00 (3-19)	9.00 (2.687)	9.00 (5-19)	7.92 (2.806)	7.00 (3-16)
Factor 2	8.46 (2.789)	8.00 (3-19)	9.00 (2.687)	9.00 (5-19)	7.92 (2.806)	7.00 (3-16)
Factor 3	8.46 (2.789)	8.00 (3-19)	9.00 (2.687)	9.00 (5-19)	7.92 (2.806)	7.00 (3-16)
Factor 4	8.46 (2.789)	8.00 (3-19)	9.00 (2.687)	9.00 (5-19)	7.92 (2.806)	7.00 (3-16)
Factor 5	8.46 (2.789)	8.00 (3-19)	9.00 (2.687)	9.00 (5-19)	7.92 (2.806)	7.00 (3-16)
Factor 6	8.46 (2.789)	8.00 (3-19)	9.00 (2.687)	9.00 (5-19)	7.92 (2.806)	7.00 (3-16)
Factor 7	8.46 (2.789)	8.00 (3-19)	9.00 (2.687)	9.00 (5-19)	7.92 (2.806)	7.00 (3-16)

Table 4. Correlation of the individual scores of the NSS with each other and with the overall score (N = 120)

Variables									Total
		Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	score
Factor 1	Pearson's r	1	0.467**	0.253**	0.217*	0.156	0.152	0.332**	0.635**
	Sig. (2-tailed)		0.000	0.005	0.017	0.088	0.098	0.000	0.000
	N	120	120	120	120	120	120	120	120

Factor 2	Pearson's r	0.467**	1	0.396**	0.301**	0.356**	0.237**	0.454**	0.725**
	Sig. (2-tailed)	0.000		0.000	0.001	0.000	0.009	0.000	0.000
	N	120	120	120	120	120	120	120	120
Factor 3	Pearson's r	0.253**	0.396**	1	0.301**	0.206*	0.292**	0.395**	0.608**
	Sig. (2-tailed)	0.005	0.000		0.001	0.024	0.001	0.000	0.000
	N	120	120	120	120	120	120	120	120
Factor 4	Pearson's r	0.217*	0.301**	0.301**	1	0.287**	0.335**	0.025	0.528**
	Sig. (2-tailed)	0.017	0.001	0.001		0.001	0.000	0.788	0.000
	N	120	120	120	120	120	120	120	120
Factor 5	Pearson's r	0.156	0.356**	0.206*	0.287**	1	0.225*	0.178	0.567**
	Sig. (2-tailed)	0.088	0.000	0.024	0.001		0.014	0.051	0.000
	N	120	120	120	120	120	120	120	120
Factor 6	Pearson's r	0.152	0.237**	0.292**	0.335**	0.225*	1	0.126	0.603**
	Sig. (2-tailed)	0.098	0.009	0.001	0.000	0.014		0.169	0.000
	N	120	120	120	120	120	120	120	120
Factor 7	Pearson's r	0.332**	0.454**	0.395**	0.025	0.178	0.126	1	0.590**
	Sig. (2-tailed)	0.000	0.000	0.000	0.788	0.051	0.169		0.000
	N	120	120	120	120	120	120	120	120

Total score	Pearson's r	0.635**	0.725**	0.608**	0.528**	0.567**	0.603**	0.590**	1
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
	N	120	120	120	120	120	120	120	120

** . Correlation is significant at the 0.01 level (2-tailed). * . Correlation is significant at the 0.05 level (2-tailed).

Discussion

The assessment of stress levels in both groups of pediatric nurses illustrated in a clear way that PNs experience moderate to high levels of stress independently of the department they work and their educational level or working experience. This finding is in accordance to previous studies that support that nurses experience intense stress even in a daily basis (la Fuente-Solana et al., 2020; Matsuishi et al., 2021; Breseti, Folgori & Bartolo, 2020; Alavi et al., 2015). PNs during the provision of daily care and the interaction with patients and their families have to face a range of challenges, conflicting emotions or even conflicts and therefore, they have to manage their moral distress and the impact on their psychological, social and professional environment in order to provide safe and effective care (Lebet et al., 2021). Based on literature, these high levels of stress are associated with the provision of critical care in pediatric patients, especially in life threatening situations, prolonged therapies and end of life care.

In general, the working environment, teamwork and collaboration with colleagues, the level of cooperation with patients' family and the level of familiarity with the technology seem to affect stress levels of nurses today in pediatric settings (Murphy et al., 2021; Martins & Robazzi, 2009). Moreover, the protective mechanisms that nurses develop in order to deal with increased stress determine the degree of their functionality not only in the provision of care but also in their interpersonal relationships and personal life (Buckley et al., 2021). For example, elevated levels of stress among health professionals are observed in physicians and nurses dealing with patients with mental disorders, cancer, AIDS and those hospitalized in intensive care units (Cavalheiro, Moura Jounior & Lopes, 2008; Liubchenko, 2007). In addition, even though nursing profession is traditionally characterized by the organization of work in shifts to ensure the continuity of care throughout the 24 hours, working in shifts is associated with sleep disturbances that can adversely affect nurses' health by reducing their performance (Rosa et al., 2019).

However, the variety of issues mentioned above are just some of the job-related stressors in the nursing profession. Long-term exposure to OS is correlated with emotional exhaustion and burnout, thus leading to weakness in decision-making, apathy, lower motivation and higher anxiety in nurses (Jones, Tanigawa & Weiss, 2003), which result in poor interest in and motivation for work, indifference to work, and poor performance (Nabizadeh-Gharghozar, Adib-Hajbagheri & Bolandianbafghi, 2020).

In the present study, there was no statistically significant difference between the groups of PONs and PNs concerning their demographic characteristics, despite the minor differences that occurred. Therefore, despite the limited size of the study, there was a clear difference in the stress levels between the two groups and more specifically PONs stated higher scores of stress in comparison to PNs. This is in accordance to previous studies and supports the finding that PONs show higher rates of OS than PNs.

Moreover, COVID-19 pandemic increased the worry and anxiety among pediatric nurses and therefore increased the occurrence of OS, anxiety and burnout among pediatric nurses and especially pediatric oncology nurses (Hinds et al., 1994; Zheng et al., 2021).

In addition, organizational support and focused supporting interventions can limit compassion fatigue, OS and burnout among pediatric oncology nurses facing death and poor prognosis of their patients in daily practice. Focus on working environment conditions and supportive interventions must be addressed in order to decrease negative outcomes for pediatric oncology health professionals (Heckman, 2012; Sullivan et al., 2019).

OS was reported by almost half nurses in our study and they related it with a variety of reasons among which information system failure, patients suffering, working conditions, collaboration with colleagues and family, and need for emotional support were the most frequently reported. In line with this finding, earlier studies reported that OS negatively affects professional life, and that information system failure and difficulty in implementing the nursing process can lead to stress, conflicts, and problems in implementing patient care practices (D'Agostino et al., 2013).

Moreover, in specialized pediatric settings that provide intense care and treat patients with life threatening conditions, such as neonatal units, effective cooperation is key factor to control and decrease stress among nurses (Raines, 1997). Eslami Akbar et al (2017), in their qualitative study noted that nurses are affected by various factors including the nature of the work, stressful working conditions, poor and unsuitable working relationships. Moreover, they commented that nurses use a variety of different strategies in order to cope influenced by intrinsic and extrinsic confounding factors, which play a significant role in the process of coping with OS.

The analysis of participants responses to NSS subscales indicated that particularly stressful factors were workload, death & suffering, conflicts with nurses and supervisors, conflicts with medical staff and treatment uncertainty, findings that are consistent with those of other studies (Lebet et al., 2021; Zhang et al., 2020). It has been argued that inter-professional conflicts contribute to stress (Gillespie & Melby, 2003). Understaffing of nursing wards can lead to burden on the nurses and increased workload (Aiken, Clarke & Sloane, 2002). The workload is a very important factor for the development of stress in the working environment (Gillespie & Melby, 2003). In addition, due to the increased workload, there is a number of recent studies supporting that burnout syndrome has become an epidemic among nurses (Bakhamis et al., 2019). Characteristically, Holdren et al. (2015) estimated that 500,000 nurses in the US do not practice the profession due to the difficulties and the demanding working conditions. Death and suffering among patients is a great source of extreme stress for the nurses, especially since nurses due to the nature of their profession have to build a therapeutic relationship with the patient and family members. Especially in chronic conditions such as cancer, this relationship due to several reasons, commonly becomes more personal and emotional (Nia et al., 2016). The uncertainty of patients' treatment outcome produces stress to nurses. Due to the different characteristics and symptoms of each patient, the provided care has to be individualized and the treatment plan should be regularly assessed and reformed in order to cover patient's needs. This feature leads to more stress in nurses and vigilance for the course of treatment applied to oncology patients (Jakovljevic et al., 2021). Therefore, patients' death stress and the stress they experience daily from

their work have a negative impact on nurses' quality of life (Nia et al., 2016).

Working conditions and especially workload and teamwork are important determinants of OS. The present study showed that conflicts with supervisors seem to be a major stress factor. The leadership behavior of supervisors can be misinterpreted by employees depending on the individual, personal, professional and other characteristics of employees and lead to conflicts (Huber & Schubert, 2019; Van Bogaert et al., 2014).

In addition, the descriptive characteristics of the factors of the NSS show that the most stressful factors for all nurses are the psychological, social and physical environment. Other researchers showed that 35% of the participating nurses wanted to quit their nursing career. They attributed this to the psychological stress they faced at work, to the low wage but also to the particular work environment in which they worked (Gardulf et al., 2005). Another study, which investigated the psychological stress experienced by health care professionals at work, found more intense stress in employees with dissatisfaction with their work. The nursing profession is particularly demanding, so nurses need to be physically, mentally and socially fit to do their job properly (Evans & Cohen, 1987). The overall work environment seems to play an important role in the onset of burnout syndrome (la Fuente-Solana et al., 2020). The inappropriate work environment is an important factor in nurses' stress and burnout syndrome (Demerouti et al., 2011). Interestingly, a study showed that patients' or their families' lack of respect for nurses' work is an independent stress factor for nurses (Chou, Hecker & Martin, 2012).

Nowadays, the social status of nursing profession and the professional status of nurses seem to affect them more than ever, especially among nurses with higher studies and clinical specialization (Shohani & Zamanzadeh, 2017).

In the present study, it was found that PONs showed statistically significant differences in the subscales of death & suffering and lack of staff support, in which they showed an increased score compared to PNs. While in the subscale of treatment uncertainty was found to indicate statistically significantly lower score, in the other subscales and factors as well as in the overall score of the NSS, no statistically significant difference was found between PONs and

PNs. Although, another study argues that the stress that nurses experience varies depending on the department in which they work. Depending on the relationship that nurses can develop with patients and depending on the severity of the patients in the ward, they experience even more demanding situations in which they are called to deal daily (Jung & Matthews, 2021; Friganovic, Selič & Ilić, 2019). In addition, interesting is the finding from the Nabirye et al. (2011) study that higher nursing education increases stress because of lack of clarity in the role and scheme of nurses with higher degrees.

It has been argued that gender appears to be related to stress with female nurses exhibiting higher levels of stress (D'Ettorre, Pellicani & Vullo, 2019; Moradniani et al., 2018). Based on our findings, gender was not associated with differences regarding level of OS in any of the pediatric nursing groups.

Also, nurses' age seems not to differentiate the stress report with the exception of treatment uncertainty, in which the stress levels of younger nurses were higher compared to older nurses. It has been previously reported that there is an interaction of OS factors with personal or demographic / social characteristics of employees, such as age, education, cultural identity (Sharma & Sharma, 2020). In parallel, in an integrative review, for more socio-demographics results were found to be inconsistent in relation to OS (Okuhara, Sato & Kodama, 2021).

The level of stress as assessed with NSS was not significantly correlated with marital status neither the number of children, with the exceptions of factor 2 (conflicts with medical staff) and factor 6 (workload), in which participants with two or more children showed lower levels of stress compared to the other groups. This finding is in accordance with previous research indicating that marital status, workload and professional conflicts as significant sources of stress in nurses (Okuhara, Sato & Kodama, 2021).

We found that the educational level of the study participants was not statistically significantly correlated to the self-reported level of stress, regardless of their specialty or the unit/clinic they work. However, in another study it was pointed out that PNs are especially susceptible to workplace stress than nurses in other wards (Liao et al., 2020). Studies with nursing students have indicated that they experience intense stress during their clinical practice due to their limited theoretical knowledge and lack of

experience in the clinical field (Melincavage, 2011; Oermann & Lukomski, 2001).

In relevance to nurses' total working experience, participants with longer working experience (> 15 years) showed lower levels of stress in NSS subscale regarding psychological environment and especially regarding treatment uncertainty (factor 7). However, neither total NSS score nor other subscale score was statistically correlated with working experience, a finding that is consistent with previous research (Okuhara, Sato & Kodama, 2021). Previous working experience has been reported to be associated with a reduction in overall stress due to peer conflicts and stress related to treatment uncertainty (Sharma & Sharma, 2020). As reported elsewhere, more experienced employees experience less professional stress (Sharma et al., 2018), while others stated that nurses with ≤ 3 years of service had the highest stress score in patient management (Liao et al., 2020).

In addition, the employment relationship was not statistically significantly correlated with nurses' stress levels with the exception of workload, with nurses that had a permanent employment contract reporting higher stress levels. It has been shown by others that the employment relationship is statistically significantly related to the occurrence of stress. It is known that fixed-time contract nurses were found to have higher stress level than permanent contract nurses (Qin et al., 2016). In our case, the stress levels were similar between the two groups, independently of the type of their contracts (fixed time or permanent staff).

The present study has its limitations. We used a convenience sample from the two major public pediatric hospitals in Greece, however, to obtain a more comprehensive data, it is suggested that nurses working in private sector should be included in future. Moreover, the study was implemented for a short period and was conducted during the outbreak of the COVID-19 pandemic that affected nurses' OS also.

On the other hand, our findings have some important implications for practice. PNs should be supported since it is clearly stated that they experience moderate stress even in daily basis, especially pediatric nurses that provide specialized care in vulnerable patients, such as children with cancer. Health care managers should ensure a supporting working environment in order to deal

with the stress of pediatric nurses. Death and suffering management strategies should be implemented and support to PONs should be strengthened.

Conclusions: Provision of pediatric nursing care is linked to increased OS, generated from a variety of factors and leads nurses to implement a number of different strategies and methods in their effort to cope. Common stressors for all PNs were their employment status, their psychological, social and physical environment, the level of workload along with the level of collaboration with nurses and physicians. However, there are also factors and conditions that affect the coping process itself. Especially for PONs, younger age, exposure to patients' death and suffering, lack of support from colleagues seem to be also important factors related to stress. This study emphasizes the presence of OS in pediatric nurses' reports, independently of their specialty. Noticeably, PONs experience more intense OS in comparison to PNs. The present study forms a basic groundwork for more focused studies targeting not only to assess nurses OS but for an in-depth analysis of protective mechanisms and coping strategies that pediatric nurses implement under the unique working conditions with children and families that are suffering.

Acknowledgments: The authors would like to thank all the nurses included in this study and the psychologists for their help, as well as the physicians for their support.

References

- Aiken, L., Clarke, S., & Sloane, D. (2002). Hospital nurse staffing and patient mortality, nurse burnout and job dissatisfaction. *Journal of the American Medical Association*, 288(16), 1987-1993.
- Alavi, A., Bahrami, M., Zargham-Boroujeni, A., & Yousefy, A. (2015). Characteristics of caring self-efficacy in pediatric nurses: A qualitative study. *Journal for Specialists in Pediatric Nursing*, 20(3), 157-164.
- Bakhamis, L., Paul III, D.P., Smith, H., & Coustasse, A. (2019). Still an epidemic: the burnout syndrome in hospital registered nurses. *The Health Care Manager*, 38(1), 3-10.
- Borhani, F., Abbaszadeh, A., Mohsenpour, M., & Asadi, N. (2013). Lived experiences of pediatric oncology nurses in Iran. *Iranian Journal of Nursing and Midwifery Research*, 18(5), 349-354.
- Bresesti, I., Folgori, L., & De Bartolo, P. (2020). Interventions to reduce occupational stress and burn

- out within neonatal intensive care units: a systematic review. *Occup Environ Med*, 77(8), 515-519.
- Buckley, L., Berta, W., Cleverley, K., & Widger, K. (2021). The Relationships Amongst Pediatric Nurses' Work Environments, Work Attitudes, and Experiences of Burnout. *Frontiers in Pediatrics*, 9, 807245.
- Cavalheiro, A.M., Moura Junior, D.F., & Lopes, A.C. (2008). Stress in nurses working in intensive care units. *Rev Lat Am Enfermagem*, 16(1), 29-35.
- Cherven, B., Jordan, D., Hale, S., Wetzel, M., Travers, C., & Smith, K. (2020). Nurse-patient connectedness and nurses' professional quality of life: Experiences of volunteering at a pediatric oncology camp. *Journal of Pediatric Oncology Nursing*, 37(2), 136-147.
- Chou, H.Y., Hecker, R., & Martin, A. (2012). Predicting nurses' well-being from job demands and resources: A cross-sectional study of emotional labour. *J. Nurse Manage*, 20(4), 502-511.
- Conte, T.M. (2011). Pediatric oncology nurse and grief education: A telephone survey. *Journal of Pediatric Oncology Nursing*, 28, 93-99.
- Conte, T.M. (2014). The lived experience of work-related loss and grief among pediatric oncology nurses. *Journal of Hospice & Palliative Nursing*, 16(1), 40-46.
- D'Agostino, F., Zega, M., Rocco, G., Luzzi, L., Vellone, E., & Alvaro, R. (2013). Impact of a nursing information system in clinical practice: a longitudinal study project. *Ann Ig*, 25(4), 329-41.
- Davis, S., Lind, B.K., & Sorensen, C. (2013). A comparison of burnout among oncology nurses working in adult and pediatric inpatient and outpatient settings. *Oncology Nursing Forum*, 40(4), e303-e311.
- Demerouti, E., Bakker, A.B., Nachreiner, F., & Schufeli, W.B. (2011). A model of burnout and life satisfaction amongst nurses. *Journal of Advanced Nursing*, 32(2), 454-464.
- D'Ettore, G., Pellicani, V., & Vullo, A. (2019). Gender assessment of job stress in healthcare workers. Implications for practice. *Med Lav*, 110(1), 22-28.
- Enskär, K. (2012). Being an expert nurse in pediatric oncology care: nurses' descriptions in narratives. *Journal of Pediatric Oncology Nursing*, 29(3), 151-160.
- Eslami Akbar, R., Elahi, N., Mohammadi, E., & Fallahi Khoshknab, M. (2017). How do the nurses cope with job stress? A study with grounded theory approach. *Journal of Caring Sciences*, 6(3), 199-211.
- Evans, G.W., & Cohen, S. (1987). Environmental stress. In: Stokols D, Altman I, ed(s). *Handbook of environmental psychology* (vol. 2). New York: Wiley, 571-610.
- Friganovic, A., Selič, P., & Ilić, B. (2019). Stress and burnout syndrome and their associations with coping and job satisfaction in critical care nurses: a literature review. *Psychiatria Danubina*, 31(suppl. 1), 21-31.
- Gardulf, A., Soderstrom, I., Orton, M., Ericsson, L., Arnetz, B., & Nordstrom, G. (2005). Why do nurses at a university Hospital want to quit their jobs? *Journal of Nursing Management*, 13(4), 329-337.
- Gillespie, M., & Melby, V. (2003). Burnout among nursing staff in accident and emergency and acute medicine: a comparative study. *Journal of Clinical Nursing*, 12(6), 842-851.
- Gray-Toft, P., & Anderson, J.G. (1981). The nursing stress scale: development of an instrument. *Journal of Behavioral Assessment*, 3(1), 11-23.
- Heckman, H.M. (2012). Stress in pediatric oncology nurses. *Journal of Pediatric Oncology Nursing*, 29(6), 356-361.
- Hinds, P.S., Quargenti, A.G., Hickey, S.S., & Mangum, G.H. (1994). A comparison of the stress-response sequence in new and experienced pediatric oncology nurses. *Cancer Nursing*, 17(1):61-71.
- Holdren, P., Paul III, D. P., & Coustasse, A. (2015). Burnout syndrome in hospital nurses. *Proceedings of the Business and Health Administration Association (BHAA) International Conference*. Chicago, IL, 2015 March.
- Huber, P., & Schubert, H.J. (2019). Attitudes about work engagement of different generations—A cross-sectional study with nurses and supervisors. *Journal of Nursing Management*, 27(7), 1341-1350.
- Isikhan, V., Comez, T., & Danis, M.Z. (2004). Job stress and coping strategies in health care professionals working with cancer patients. *European Journal of Oncology Nursing*, 8, 234-244.
- Jakovljevic, K., Kober, K.M., Block, A., Cooper, B.A., Paul, S.M., Hammer, M.J., Cartwright, F., Conley, Y.P., Wright, F., Dunn, L.B., Levine, J.D., & Miaskowski, C. (2021). Higher Levels of Stress Are Associated With a Significant Symptom Burden in Oncology Outpatients Receiving Chemotherapy. *J Pain Symptom Manage*, 61(1), 24-31.e4.
- Jones, D.L., Tanigawa, T., & Weiss, S.M. (2003). Stress management and workplace disability in the US, Europe and Japan. *J Occup Health*, 45(1), 1-7.
- Jung, M.Y., & Matthews, A.K. (2021). Understanding Nurses' Experiences and Perceptions of End-of-Life Care for Cancer Patients in Korea: A Scoping Review. *J Palliat Care*, 36(4), 255-264.
- Ko, W., & Kiser-Larson, N. (2016). Stress levels of nurses in oncology outpatient units. *Clinical Journal of Oncology Nursing*, 20(2), 158-164.
- la Fuente-Solana, D., Inmaculada, E., Pradas-Hernández, L., Ramiro-Salmerón, A., Suleiman-Martos, N., Gómez-Urquiza, J.L., & Albendín-García, L. (2020). Burnout syndrome in paediatric oncology nurses: A systematic review and meta-analysis. *Healthcare*, 8(3), 309.
- Lebet, R.M., Hasbani, N.R., Sisko, M.T., Agus, M.S.D., Nadkarni, V.M., Wypij, D., & Curley, M.A.Q. (2021).

- Nurses' Perceptions of Workload Burden in Pediatric Critical Care. *Am J Crit Care*, 30(1), 27-35.
- Liao, H., Tang, W., Huang, Y., Liu, M., Zhang, Y., Zhang, L., & Ai, T. (2020). Stressors, coping styles, and anxiety & depression in pediatric nurses with different lengths of service in six tertiary hospitals in Chengdu, China. *Translational Pediatrics*, 9(6), 827-834.
- Liubchenko, P.N. (2007). Prevention of and coping with professional stress. *Klinicheskaia Meditsina*, 85(9), 22-27.
- Martins, J.T., & Robazzi, M.L. (2009). Nurses' work in intensive care units: feelings of suffering. *Rev Lat Am Enfermagem*, 17(1), 52-58.
- Matsuishi, Y., Mathis, B.J., Masuzawa, Y., Okubo, N., Shimojo, N., Hoshino, H., Enomoto, Y., & Inoue, Y. (2021). Severity and prevalence of burnout syndrome in paediatric intensive care nurses: A systematic review. *Intensive Crit Care Nurs*, 67, 103082.
- Melincavage, S.M. (2011). Student nurses' experiences of anxiety in the clinical setting. *Nurse Education Today*, 31(8), 785-789.
- Moradniani, M., Eskini, M., Mirbeik-Sabzevari, Z., Sheikhi, E., Tarahi, M.J., & Imani-Nasab, M.H. (2018). Is there a relation between gastroesophageal reflux disease and occupational stress among nurses? A case study from Iran 2016. *Govaresh*, 23(2), 114-120.
- Murphy, J.M., Chin, E.D., Westlake, C.A., Asselin, M., & Brisbois, M.D. (2021). Pediatric Hematology/Oncology Nurse Spirituality, Stress, Coping, Spiritual Well-being, and Intent to Leave: A Mixed-method Study. *Journal of Pediatric Oncology Nursing*, 38(6), 349-363.
- Nabirye, R.C., Brown, K.C., Pryor, E.R., & Maples, E.H. (2011). Occupational stress, job satisfaction and job performance among hospital nurses in Kampala, Uganda. *Journal of Nursing Management*, 19(6), 760-768.
- Nabizadeh-Gharghozar, Z., Adib-Hajbaghery, M., & Bolandianbafghi, S. (2020). Nurses' Job Burnout: A Hybrid Concept Analysis. *Journal of Caring Sciences*, 9(3), 154-161.
- Naholi, R.M., Nosek, C.L., & Somayaji, D. (2015). Stress among new oncology nurses. *Clinical Journal of Oncology Nursing*, 19(1), 115-117.
- Nia, H.S., Lehto, R.H., Ebadi, A., & Peyrovi, H. (2016). Death anxiety among nurses and health care professionals: A review article. *International Journal of Community Based Nursing and Midwifery*, 4(1), 2-10.
- Oermann, M.H., & Lukomski, A.P. (2001). Experiences of students in pediatric nursing clinical courses. *Journal for Specialists in Pediatric Nursing*, 6(2), 65-72.
- Okuhara, M., Sato, K., & Kodama, Y. (2021). The nurses' occupational stress components and outcomes, findings from an integrative review. *Nurs Open*, 8, 2153-2174.
- Papadatou, D. (2001). The grieving healthcare provider: Variables affecting the professional response to a child's death. *Bereavement Care*, 20(2), 26-29.
- Perry, B., Toffner, G., Merrick, T., & Dalton, J. (2011). An exploration of the experience of compassion fatigue in clinical oncology nurses. *Can Oncol Nurs J*, 21(2), 91-105.
- Qin, Z., Zhong, X., Ma, J., & Lin, H. (2016). Stressors affecting nurses in China. *Contemporary Nurse*, 52(4), 447-453.
- Raines, D.A. (1997). Values influencing nursing practice: responses from neonatal nurses. *Journal for Specialists in Pediatric Nursing*, 2(2), 55-62.
- Rosa, D., Terzoni, S., Dellafiore, F., & Destrebecq, A. (2019). Systematic review of shift work and nurses' health. *Occupational Medicine*, 69(4), 237-243.
- Sharma, N., Takkar, P., Purkayastha, A., Jaiswal, P., Taneja, S., Lohia, N., & Augustine, A.R. (2018). Occupational stress in the Indian army oncology nursing workforce: a cross-sectional study. *Asia-Pacific Journal of Oncology Nursing*, 5(2), 237-243.
- Sharma, S.K., & Sharma, N. (2020). Hospital preparedness and resilience in public health emergencies at district hospitals and community health centers. *Journal of Health Management*, 22(2), 146-156.
- Shohani, M., & Zamanzadeh, V. (2017). Nurses' attitude towards professionalization and factors influencing it. *Journal of Caring Sciences*, 6(4), 345-357.
- Spinetta, J.J., Jankovic, M., Ben Arush, M.W., Eden, T., Epelman, C., Greenberg, M.L., Martins, G.A., Mulhern, K.R., Oppenheim, D., & Masera, G. (2020). Guidelines for the recognition, prevention, and remediation of burnout in health care professionals participating in the care of children with cancer: Report of the SIOP working committee on psychosocial issues in pediatric oncology. *Medical and Pediatric Oncology*, 35, 122-125.
- Sullivan, C.E., King, A.R., Holdiness, J., Durrell, J., Roberts, K.K., Spencer, C., Roberts, J., Ogg, S.W., Moreland, M.W., Browne, E.K., Cartwright, C., Crabtree, V.M., Baker, J.N., Brown, M., Sykes, A., Mandrell, B.N. (2019). Reducing Compassion Fatigue in Inpatient Pediatric Oncology Nurses. *Oncol Nurs Forum*, 46(3), 338-347.
- Van Bogaert, P., Adriaenssens, J., Dilles, T., Martens, D., Van Rompaey, B., & Timmermans, O. (2014). Impact of role-, job-and organizational characteristics on Nursing Unit Managers' work related stress and well-being. *Journal of Advanced Nursing*, 70(11), 2622-2633.
- Vega Vega, P., González Rodríguez, R., Santibáñez Galdamez, N., Ferrada Molina, C., Spicto Orellana, J., Sateler Villanueva, A., & Bustos Melo, J. (2015). Supporting in grief and burnout of the nursing team from pediatric units in Chilean hospitals. *Rev Esc Enferm USP*, 51, e03289.

- Ventovaara, P., Sandeberg, M.A., Räsänen, J., & Pergert, P. (2021). Ethical climate and moral distress in paediatric oncology nursing. *Nursing Ethics*, 28(6), 1061-1072.
- Zander, M., Hutton, A., & King, L. (2010). Coping and resilience factors in pediatric oncology nurses CE. *Journal of Pediatric Oncology Nursing*, 27(2), 94-108.
- Zhang, X.J., Song, Y., Jiang, T., Ding, N., & Shi, T.Y. (2020). Interventions to reduce burnout of physicians and nurses: An overview of systematic reviews and meta-analyses. *Medicine (Baltimore)*, 99(26), e20992.
- Zheng, R., Zhou, Y., Qiu, M., Yan, Y., Yue, J., Yu, L., Lei, X., Tu, D., & Hu, Y. (2021). Prevalence and associated factors of depression, anxiety, and stress among Hubei pediatric nurses during COVID-19 pandemic. *Compr Psychiatry*, 104, 152217.