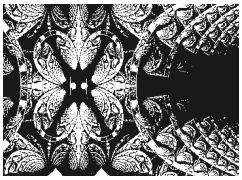

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AN ASSESSMENT OF STRESS IN AN INTENSIVE CARE UNIT (ICU): AN EXPLORATORY STUDY UTILISING SELF-ASSESSMENT, PHYSIOLOGICAL, AND SALIVARY CORTISOL MEASURES

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The study investigates exposure to stress by respondents working in an Intensive Care Unit (ICU) and differences in using three instruments to measure stress. The survey was conducted from September to October 2018 in Dubrava Clinical Hospital in the ICU unit, with forty-one (41) healthcare professionals. Three forms of testing were set up: self-evaluation of stress, measurements of physiological indicators, and cortisol levels. The results show a statistically significant difference in mean cortisol levels, with the first sample much higher than other samples. There were significant interactions between skin conduction (SC) and stress levels, where all participants exhibited increases in SC. Heart rate variability (HRV) shows a slight correlation with stress levels in the group possessing substantially more stress experience. Although some differences were observed, all stress elements for professionals working in ICUs indicates that they cope well with stressful situations.

Keywords: stress, ICU, physiology, cortisol level, healthcare professionals

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INTRODUCTION

The impact of stress has been researched for many years, often focusing on those professionals frequently exposed to such effects. Working at complex, demanding workplaces such as in ICUs often leads to fatigue and burnout syndrome in the medical staff. Fatigue and burnout syndrome are reflected physically and mentally in the professional and private lives of such staff (Van Mol et al., 2015; Elshaer et al., 2018; Arrogante & Aparicio-Zaldivar, 2017). Most healthcare professionals working in ICUs experience some form of stress (Almeida et al., 2016). A link exists between the perception of stress and psychosomatic symptoms such as headaches, insomnia, fatigue, despair, lower back pain, frequent mood swings, and illness in nurses (Milutinović et al., 2012; Lu, 2008). Subjects performing a self-assessment most often successfully assess stress, but cortisol levels in saliva elevate in women and men with burnout syndrome compared to the control group (Grossi et al., 2005). Measured physiological parameters can indicate how well health professionals cope with stress and specific physical changes caused by over-exposure to stress. Due to challenges at work, biological markers are expected to show elevated values in professionals working in ICUs, including neonatology intensive care units (NICU), and emergency rooms (ER). Morning cortisol levels are significantly higher when working in emergency situations than working with patients in routine situations. In doing so, the rise and fall of these values are not in line with an individual's perception of stress (Backé et al., 2009; Fujimaru et al., 2012). The total duration of work and level of education might very well be a significant predictor of overall stress, where almost 50% of nurses working in ICUs experience high levels of stress and burnout, indicating the need for prevention programmes (Capan, 2017; Šmaguc, 2016). Cortisol levels are a good indicator of stress in healthcare professionals employed in the most challenging services. Under stress, cortisol levels are much higher during work hours, regardless of gender and work experience (González-Cabrera et al., 2018). When exposed to intense stress, changes in cardiac output occur in addition to increased cortisol values (Looser et al., 2010). Research has found a relationship between stressful situations and physical health due to physiological, neuroendocrine, and immune function (Hudek-Knežević et al., 2005; Hudek-Knežević & Kardum, 2006). Stressful workplace events are significantly associated with a higher level of education and a perception of flow control in the workplace (Trousselard et al., 2016). Stress experienced by healthcare professionals working in the ICU is associated with the extent of serious health conditions in patients, sophisticated technology, noise exposure, and unpredictable emergency interventions (Fredrik-

son & Matthews, 1990; Perez et al., 2013; Dalia et al., 2013; Kiekkas et al., 2006; Minton & Batten, 2015; Gough et al., 2014). The prolonged duration of stress at work can lead to chronic fatigue syndrome, which is likely to affect the quality of medical care (Fredrikson & Matthews, 1990). Given the lack of research on the impact of stress on ICU employees using multiple measurement instruments, the aim of this paper was to assess stress exposure by employees working in ICUs and whether there is a difference in the results obtained from the instruments used in the study. Physiological reactions make it possible to follow an affective, cognitive, and body state through provoked reaction.

The study investigates and explores exposure by respondent to the stress in ICUs and differences using three instruments for measuring stress.

METHODOLOGY AND SUBJECTS

The survey was conducted from September to October 2018 at the ICU within the Dubrava Clinical Hospital in Zagreb, where forty-one (41) respondents were surveyed. The study used three forms of testing: self-evaluation of stress, measurements of physiological indicators and cortisol levels. From the standpoint of ethical standards, respondents were given information about the research, objectives, and the procedure. The hospital's ethics committee gave their approval for the research to go ahead. The assessments were conducted between 7am and 5pm during the participants' work shifts. Eight participants were assessed each day by self-evaluation, physiology, and cortisol measurement, one per hour. They filled out the questionnaire and performed physiological and cortisol testing. Cortisol was collected four times a working day for each participant.

For the self-assessment part, we used a validated Workplace Stress Questionnaire (WSQ) from the School of Public Health, School of Medicine, University of Zagreb, containing 37 questions on the impacts of stress relating to work organisation, working in shifts, career advancement, education, professional requirements, interpersonal communication, communication with patients, and the fear of dangers and jeopardies in health care. The goal of the research was to assess the differences between the three instruments for stress measurement. Specifically, we were interested in comparing the subjective self-evaluation with the objective physiological reactions. Participants filled out the questionnaire before physiological testing. On their workdays, the participants came from ICU in the testing room and rested for five minutes before being physiologically tested. Physiological measurements combined a Trier Social Stress Test (Kirschbaum et al., 1993) using the Stroop word and colour test, mathematical test, and re-

quired preparing a speech by the respondent within a set time. After 5 minutes of additional adaptation, sensors were applied, and the signal was checked (2 min). Before and after each stressor, the respondent was instructed to sit and relax for 2 minutes. The protocol was implemented using the software BioTrace +, Version Iv 2018, Mind Media BV. During protocol implementation, physiological changes and parameters were monitored using a Nexus 10 Wireless Physiological Monitoring and Feedback platform which enabled storage and further processing of data using the BioTrace+ software. Peripheral temperature (TEMP), blood volume pulse (BVP), heart rate (HR), breathing and skin conduction level (SC) were recorded between 9 am and 5 pm in a quiet room. The procedures for recording physiology are shown in Table 1.

➲ TABLE 1
Procedure for recording physiology (Stress test)

BASELINE	5 minutes
STRESSOR 1	Stroop test 2 minutes
RELAX.	2 minutes
STRESSOR 2	Math test 2 minutes
RELAX.	2 minutes
STRESSOR 3	Preparation of speech 2 minutes
RELAX.	5 minutes

Salivary cortisol samples were obtained from each respondent at four points during each respondent's test day: at the beginning of their shift, before and after the stress test, and at the end of their shift.

Statistical analysis

All collected data were analysed using the SPSS IBM statistical package (version 23). Descriptive statistics describe the basic features of a sample in a study (proportions for categorical data and mean and standard deviation for normally distributed continuous variables, or median and interquartile range for variables deviating from a normal distribution). When checking for differences between demographic categories (e.g., gender, work experience, age), independent samples t-test and one-way ANOVA were used for normally distributed variables, and Mann-Whitney or Kruskal-Wallis for cortisol and physiological variables deviating from the normal distribution. The sample was split into two subgroups according to the perceived stress level (low and high stress) and changing independent variables measured over time. For continuous variables and three or more measurements in time (paired samples), two-way repeated-measures ANOVA were used given that Levene's tests of equality of variances showed variances which were homogenous in two subsamples.

RESULTS

Most of the respondents were female (75.6%), nurses (87.7%) single (58.5%) with no children, and according to age, most of them were between 30–39 years of age (41.5%). Years of work experience were mainly between 10–20 years (34.1%). According to the number of years at the current workplace, the equal percentage was from 1.1 to 5 years, 5.1 to 10, and 10.1 to 20 (24.4%). A small percentage of the respondents have worked at their current job for less than one year (19.5%), and only three respondents have been at the job for more than 20 years. The number and percentage of respondents based on demographics is shown in Table 2.

➲ TABLE 2
Number and percentage of respondents based on demographics

		n	(%)
Gender	Male	10	(24.4)
	Female	31	(75.6)
	Total	41	(100.0)
Age	> 20	4	(9.8)
	21 – 29	14	(34.1)
	30 – 39	17	(41.5)
	40 – 49	5	(12.2)
	60+	1	(2.4)
	Total	41	(100.0)
Occupation	Nurse	24	(58.5)
	BACC RN	11	(26.8)
	MA RN	1	(2.4)
	specialist physicians	3	(7.3)
	medical interns	2	(4.9)
	Total	41	(100.0)
Marital status	married	16	(39.0)
	single	24	(58.5)
	divorced	1	(2.4)
Number of children	0	27	(65.9)
	1	6	(14.6)
	2	7	(17.1)
	3	1	(2.4)
	Total	41	(100.0)
Years of work experience	> 1 year	7	(17.1)
	1.1 do 5 years	9	(22.0)
	5.1 – 10 years	6	(14.6)
	10.1 – 20 years	14	(34.1)
	< 21 years	5	(12.2)
	Total	41	(100.0)
Years of work experience – current position	> 1 year	8	(19.5)
	1.1 – 5 years	10	(24.4)
	5.1 – 10 years	10	(24.4)
	10.1 – 20 years	10	(24.4)
	< 21 years	3	(7.3)
	Total	41	(100.0)

According to their nutritional and health condition, respondents most often have two meals a day, in line with standard nutritive values. Most respondents (93%) have no medical history, and 98% do not use sick leave. The WSQ results were summarised according to instructions at the end of the questionnaire. The results of individual factors and the overall stress levels are shown in Table 3 and Table 4.

TABLE 3
Descriptive features of the Workplace Stress Questionnaire (WSQ) subscale

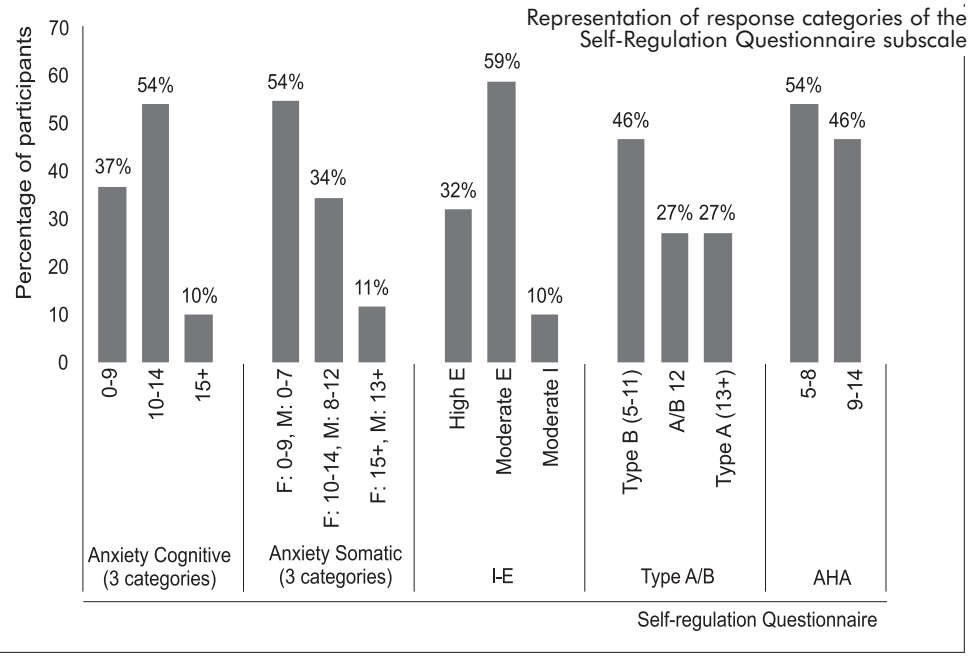
	Mean	*SD*	Median	1. quartile	3. quartile	Min.	Max.	Valid *N*
Organisation and finance	55.67	20.95	57.50	46.25	67.50	2.50	95.00	41
Public criticism and lawsuits	43.64	20.57	42.86	32.14	50.00	0.00	92.86	41
Dangers and harm at work	28.66	16.38	25.00	17.86	39.29	0.00	78.57	41
Conflicts and communicationat work	46.49	24.65	43.75	31.25	68.75	0.00	93.75	41
Shift work	50.30	27.35	50.00	28.13	75.00	0.00	100.00	41
Professional and intellectual requirements	39.29	19.38	42.86	28.57	46.43	0.00	82.14	41
The overall experience of stress	46.62	16.64	47.30	35.81	53.72	0.68	85.14	41

TABLE 4
Descriptive features of the Self-Regulation Questionnaire (SRQ)

	Mean	*SD*	Median	1. quartile	3. quartile	Min.	Max.	Valid *N*
Anxiety – Cognitive	10.66	3.24	10.00	8.50	10.00	5.00	20.00	41
Anxiety – Somatic	9.59	3.18	8.00	7.50	8.00	5.00	20.00	41
I-E	13.49	2.35	14.00	12.00	14.00	9.00	19.00	41
Type A / B	11.29	2.69	12.00	9.50	12.00	5.00	18.00	41
AHA	8.85	1.77	8.00	8.00	8.00	5.00	12.00	41

I-E Introversion/Extroversion; Type A/B Type A and Type B personality; AHA Anger/ Hostility/ Aggression

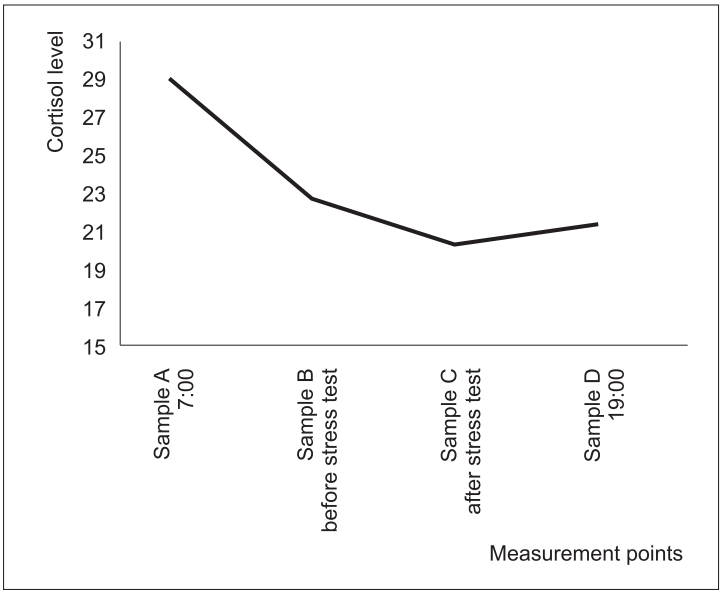
FIGURE 1
Representation of response categories of the Self-Regulation Questionnaire subscale



Self-regulation variables were recoded as categories according to instructions provided and the percentages of respondents in each type of existing subscales as shown in Figure 1.

The average salivary cortisol level at the four measurement points is shown in Figure 2.

➲ FIGURE 2
Average salivary cortisol level at four measurement points



Based on the distributions, the Friedman test was used instead of variance analysis with repeated measurements. A statistically significant difference in average cortisol levels ($p < 0.001$) was found, with the level in the first sample significantly higher compared to all other three samples (all $p < 0.05$).

Impact of demographic characteristics on stress levels

Analysis was undertaken based on gender, age (reduced categories), and years of work experience. A comparison of questionnaire scores and physiology showed gender differences in perceiving stress at work. There are no statistically significant gender differences in the self-reporting of stress levels and cortisol levels in 4 measurements. In terms of physiology, men and women differ in the value of $TEMP^0$, HR^0, HR^1 and HR^2, including Normal-Normal $(NN)^0$ and NN^1. The table below shows the differences – Heart Rate (HR) is higher in women and other physiological factors measured in men (see Table 5).

According to age and years of work experience, there are no significant differences. To determine the correlation between total experience of stress and self-regulation, cortisol levels, and physiological measures, Spearman's correlation coefficient was used given the small sample size and the fact that some variables deviate from normal distribution.

Median Gender	$TEMP^0$	$TEMP^1$	$TEMP^2$	HR^0	HR^1	HR^2	NN^0	NN^1
Male	*35.74*	35.71	35.81	71.00	79.14	70.83	*861.65*	*855.85*
Female	32.67	34.59	34.74	*85.12*	*92.78*	*82.14*	710.27	736.09
Total	34.35	35.33	35.28	82.57	91.35	81.20	728.92	758.72

TABLE 5
Differences between men and women at physiological measurements

Except for self-reporting, I-E, and Reactivity, all other subscales for total score are low and exhibit a moderately positive correlation with Overall Stress Experience. Association between cortisol levels and overall workplace stress was found. A slight negative correlation between the total experience of stress with HF^0 and a low positive relationship with the HF/LF^0 ratio was identified (see Table 6).

	Total experience of stress	Legend
SC^0	0.257	the average value of skin conduction level during 5' baseline
SC^1	0.070	the average value of skin conduction level during stress (3x2')
SC^2	0.122	the average value of electrical conductivity of the skin during 5' relaxation
$TEMP^0$	0.023	the average value of peripheral skin temperature during 5' baseline
$TEMP^1$	-0.077	the average value of peripheral skin temperature during stress
$TEMP^2$	-0.075	the average value of peripheral skin temperature during 5' relaxation
HR^0	0.168	average heart rate during 5 minutes of baseline
HR^1	0.268	average heart rate during stress
HR^2	0.171	average heart rate for 5' after stressors
NN^0	-0.160	average IBI interval (IBI – Interbeat interval or "Normal – Normal" interval) during 5' baseline
NN^1	-0.078	average IBI interval during 5' relaxation
$RMSSD^0$	-0.193	a measure derived from the differences of the LV interval during the 5' baseline
$RMSSD^1$	-0.092	a measure derived from the differences of the LV interval during the 5' relaxation
$SDNN^0$	-0.118	a measure derived from LV interval differences (standard LV interval deviation) during 5' baseline
$SDNN^1$	-0.037	a measure derived from LV interval differences during 5' relaxation
LF^0	0.168	percentage of LF power (low frequencies) during 5' baseline
LF^1	0.110	percentage of LF power (low frequencies) during 5' relaxation
HF^0	-0.341*	percentage of HF power (high frequencies) during 5' baseline
HF^1	-0.119	percentage of HF power (high frequencies) during 5' relaxation
LF/HF^0	0.328*	the ratio of LH and HF (LH / HF) during 5' baseline
LF/HF^1	0.170	the ratio of LH and HF (LH / HF) during 5' relaxation

*$p < 0.05$, **$p < 0.01$

TABLE 6
Relationship between total experience of stress and physiological variables

The experience of stress recoded according to the given instructions – all with a score > 60 was classified as belonging to the "high stress" group and others in the "low-to-moderate" group. A series of Friedman and Wilcoxon tests for depend-

ent comparisons verifies the statistical significance between high- and low-stress groups with respect to physiological variables – optimally at points before and after exposure to stress, as some variables deviate from the normal distribution. An ideal statistical analysis is a one-factor repeated measure ANOVA. Given the deviation from the normal distribution, the variance of the results in both groups should be homogeneous as a prerequisite and it should not statistically differ significantly. The distributions similarly deviate from the Gaussian curve in both subgroups, which is not a barrier to ANOVA. The Bonferroni correction for multiple comparisons was used (see Table 7).

TABLE 7
Difference between groups of perceived high and low levels of stress in measured parameters (cortisol and physiology), over time

		Measurement								
		First		Second		Third		Fourth		F, P for
	Stress	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	time x stress
Cortisol	not high	27.59	11.00	22.21	11.37	19.59	9.20	21.26	13.78	$F_{(2.3,114)} = 1.922$,
	high (>60)	37.17	8.18	24.33	10.80	22.67	8.91	20.33	6.02	$p = 0.145$
SC	not high	1.78	1.02	2..80	1.22	2.60	1.26			$F_{(2,76)} = 1.547$,
	high (>60)	1.90	0.60	2.52	0.56	2.37	0.60			*$p = 0.039$*
TEMP	not high	33.01	4.00	34.02	3.28	34.06	3.16			$F_{(1.2,76)} = 0.177$,
	high (>60)	31.11	6.26	31.73	5.53	32.03	5.57			$p = 0.718$
HR	not high	81.07	13.82	89.18	13.02	80.17	12.71			$F_{(1.37)} = 0.869$,
	high (>60)	87.71	10.43	93.19	8.98	83.99	10.63			$p = 0.384$
NN	not high	769.81	139.48	781.88	130.41					$F_{(1,38)} = 6.185$,
	high (>60)	699.21	80.15	749.17	96.28					*$p = 0.017$*
RMSD	not high	39.78	23.37	42.99	21.82					$F_{(1,38)} = 2.225$,
	high (>60)	36.08	17.74	47.27	23.77					$p = 0.141$
SDNN	not high	51.25	22.48	55.67	25.64					$F_{(1,38)} = 0.026$,
	high (>60)	49.54	24.01	55.17	25.81					$p = 0.874$
LF	not high	46.56	14.84	51.32	12.46					$F_{(1,38)} = 002$,
	high (>60)	44.40	10.95	48.80	7.08					$p = 0.963$
HF	not high	36.67	17.52	32.87	13.62					$F_{(1,38)} = 3.017$,
	high (>60)	30.47	17.20	37.57	8.75					$p = 0.090$
LF/HF	not high	1.97	1.99	2.37	2.71					$F_{(1,38)} = 0.562$,
	high (>60)	1,92	1.11	1.40	0.49					$p = 0.458$

Legend. SC = the value of skin conduction level; TEMP = the value of peripheral skin temperature during 5' baseline; HR = the value of heart rate; NN = the average IBI interval (IBI – Interbeat interval or "Normal – Normal" interval); RMSSD = a measure derived from the differences of the LV interval; SDNN = a measure derived from LV interval differences (standard LV interval deviation); LF = percentage of LF power (low frequencies); HF = percentage of HF power (high frequencies); LF/HF = the ratio of LH and HF (LH / HF)

The results show statistically significant interactions between SC and stress levels ($F(2,76) = 1.547$, $p = 0.039$), with an increase in SC in both groups. Nonetheless, this increase was

smaller in the group with intense stress. The NN interval was statistically significantly correlated with the stress level but less so in the group with a more substantial stress experience ($F(1.38) = 6.185$, $p = 0.017$).

DISCUSSION

The main finding is that the self-evaluation report of stress showed no statistical difference based on demographic data. According to self-evaluation of stress, most respondents were in the low-stress level group and showed no statistical differences based on demographic data. A comparison of questionnaire scores and physiology showed differences between men and women in their perception of stress at work. Other research studies found stressful workplace events significantly associated with a higher level of education and perception of flow control in the workplace, but no gender differences (Trousselard et al., 2016). Better team collaboration and relationships between doctors and nurses leads to greater job satisfaction, strengthening competencies, and reducing stress levels (Rydenfält et al., 2018; Kvande et al., 2017).

The physiological differences between men and women were visible in essential measurements of peripheral temperature, heart rate across all intervals, and NN intervals at the beginning and end. Males had a higher baseline temperature value, females had a higher heart rate across all three measurements, whereas males had higher NN intervals than females in both measures. The obtained differences indicate that physiological indicators of stress are less pronounced in males. One research found gender differences in the autonomic nervous system, which may be present because of developmental differences or due to the effects of prevailing levels of male and/or female sex hormones (Dart et al., 2002). Dart found there is a preponderance of sympathetic mediated responses in males and of parasympathetic in females – perhaps related to divergent gender roles pertaining to human evolution (Dart et al., 2002). An increase in physiological indicators can lead to the onset of severe symptoms of anxiety, PTSD, burnout syndrome at work, and other psychosomatic disorders. Heart rate variability (HRV) and the NN interval undergo change depending on the ANS action. In stressful events, the sympathetic part of ANS accelerates physiological functions with the cardiovascular system achieving a higher HR and decrease in HRV, manifested by an increase in the NN interval. In the obtained results, changes in the NN interval were more pronounced in the group undergoing intense stress rate compared to the group with lower stress intensity. Jarczok found a negative and significant association

between vagally-mediated HRV and measures of stress at work and a negative and significant association to mixed sympathetic and parasympathetic measures of HRV. The authors provided evidence that adverse psychosocial work conditions are negatively associated with ANS function as indexed by HRV (Jarczok et al., 2013).

SC showed an increase in both groups of subjects; a minor increase in these values was noted in the group with intense stress. The results indicate that a constant higher value is present during the day. Nonetheless, it was impossible to measure SC values after 24 hours to determine whether there exists a trend of SC values returning to the baseline measurement. A long time ago, the season and time of the day of testing SC levels were found to be important mainly in interaction with sex, and have given rise to the suggestion that females may be more responsive to environmental conditions than men (Venables & Mitchell, 1996).

The research found no similar data in measuring physiology, with mildly provoked stress in ICU health professionals. It was not possible to compare these results with other studies.

According to the self-assessment results, although none of the questionnaire categories proved significantly stressful for the respondents, the highest contributing factor was work, finances and work positions during shifts. Stressful workplace events were significantly associated with a higher level of education and perception of flow control in the workplace, without gender differences (Trousselard et al., 2016). In Croatia, in hospitals, the workplace connects with the level of education and finances which could lead to higher stress levels. Previous research on the impact of stress on ICU employees has been linked to chronic fatigue syndrome, burnout syndrome, depersonalisation, the onset of musculoskeletal symptoms, changes in shift work, and workloads with patients (Fredrikson & Matthews, 1990; Terzi et al., 2019; Baptista, 2013; Lee et al., 2014; Chang, 2018).

The salivary cortisol level was significantly higher in the first sample than others, indicating that employees feel more stress when coming to work than during work, suggesting that initial stress is related to the uncertainty they expect during work adjustment. Uncertainties upon arriving at work and unpredictable emergencies can increase cortisol levels and reduce recovery during work. According to Sluiter et al. (2003), endocrine reactions during and after treating patients in an emergency during the morning hours were higher when compared to the treatment of regular patients, i.e., cortisol levels

decreased more slowly after treating emergency patients (Sluiter et al., 2003). Other research has shown that increased cortisol levels are associated with the duration of work in an ICU, subsequently leading to the onset of stress-related illnesses (Yamaguti et al., 2015).

The value of this research is its assessment of the impact of stress factors on ICU employees and the monitoring of various measurements when searching for possible differences in the obtained results. The conclusion in this paper is that all measuring instruments indicated that the analysed group adequately copes with stressful situations. It is interesting that once they were focusing on their jobs, they were less stressed. What may be important is not how stressed they are but how "strong" and resilient they are and why might this be. Further research should include a higher number of respondents and a different group of respondents from another type of work or occupation. We consider this research as a pilot study according to the number of participants. The research has confirmed that there are not many differences between the three types of measurement. We expected differences in the obtained results, primarily more differences in physiological measurement compared to self-assessment. Also, we expected an increase in cortisol value levels during the working day, but the highest values were at the beginning of work.

CONCLUSION

Although some differences were observed in the three measured components, all three measured stress elements in the ICU showed that employees generally cope well with stressful situations, probably adopting specific mechanisms to protect the impact of stressors on the body and its functioning. Future research should include a larger group of participants and a control group of the same or different business profiles. Further research could be on resilience and coping mechanisms. What may be important is not how stressed they are but how "strong" and resilient they are and why might this be. Positive thinking, optimism, the meaning of life, and positive emotions could reduce stress and negative feelings. Sports and some other means of coping training also lead to reducing stress. It could be interesting to see in future research what people use in their life to reduce the impact of stress.

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Procjena razine stresa u Jedinici intenzivnoga liječenja (JIL) uz primjenu samoprocjene, fizioloških pokazatelja i analize kortizola u slini

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Studija istražuje izloženost stresu ispitanika koji rade u Jedinici intenzivnoga liječenja (JIL-u) i razlike u upotrebi triju mjernih instrumenata stresa. Istraživanje je provedeno od rujna do listopada 2018. u Kliničkoj bolnici Dubrava u JIL-u, na četrdeset i jednom (41) zdravstvenom djelatniku. Postavljena su tri oblika testiranja: samoprocjena stresa, mjerenje fizioloških pokazatelja i razine kortizola. Rezultati pokazuju statistički značajnu razliku u srednjim razinama kortizola, pri čemu je prvi uzorak znatno viši od ostalih uzoraka. Postojale su značajne interakcije između provodljivosti kože (SC) i razine stresa, pri čemu su svi sudionici pokazali povećanje SC-a. Varijabilnost srčanoga ritma (HRV) pokazuje blagu korelaciju s razinama stresa u skupini koja ima znatno više iskustva sa stresom. Iako su uočene neke razlike, svi mjerni pokazatelji stresa pokazuju da se zdravstveni djelatnici u JIL-u dobro nose sa stresnim situacijama.

Ključne riječi: stres, JIL, fiziologija, razina kortizola, zdravstveni djelatnici