

## EXPANSION OF PSYCHOSOCIAL DISTRESS IN NURSES WORKING IN HEMODIALYSIS DURING EXPOSURE TO COVID-19 PANDEMIC IN BULGARIA

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**Abstract.** A new type of virus, SARS-CoV-2, has spread globally throughout the world. The COVID-19 epidemic rapidly spread worldwide. The health care system, society and medical professionals have prepared to adapt, train and resist the increased psychosocial pressure. In this situation, the role and place of medical professionals has become noticeably more prominent, and the psychosocial stress of the work environment has increased its impact – progressing to high levels of harmful intensity towards the medical professionals. Focusing within the borders of Bulgaria, it can be argued that the initial two waves of high levels of COVID-19 prevalence were difficult and critical to overcome. The aim of our study is to investigate the impact of psychosocial stress on the functional status examined with the response of arterial blood pressure of nurses, practicing long-term care in hemodialysis clinics and centers during exposure to COVID-19 pandemic. A study was conducted on the subjective assessment of psychological and social risk factors, and arterial systolic and diastolic blood pressure in 2018-2019 (pre-COVID-19 period) and 2020 (COVID-19 period), respectively. The methods used were the NIOSH questionnaire – to assess psychosocial stress at work and to measure blood pressure with a sphygmomanometer. The results showed that the expansion of psychosocial risks from the work environment impacted on the functional status of nurses, with an increase in the level of social support and systolic blood pressure during the COVID-19 compared to the pre-COVID-19 period, and a decrease in the level of control when comparing the same periods. We will monitor and observe these effects with concern in order to respond in a timely manner with effective and practical strategies, policies and programs to counter and prevent psychosocial stress in the workplace. One of the outlined guiding goals and trends for this will be to both preserve and prolong the work life of nurses and to reposition them as a key and significant group for the healthcare system.

**Key words:** COVID-19 pandemic, psychosocial stress, nurses, hemodialysis, arterial blood pressure

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## INTRODUCTION

The unexpected pandemic of COVID-19 has dramatically transformed our modern world. The standard and accustomed social, economic and societal order has had to stressfully adapt and synchronize with the global dynamics of a pandemic of COVID-19. A significant part of the burden and responsibility was born by nurses who worked continuously in high-risk inpatient and outpatient environments. The uncertainty, expansive dynamics, tensions and technological innovations in this pandemic environment sharply increased both individual and professional demands. Consequently, the burden of stress exposure was palpably felt and increased. Nurses were exposed to and continued to give professional care to indigent patients in an environment with a high personal health risk, with rising morbidity. They are exposed to the detrimental influence of psychosocial factors of their professional lives, which are reflected in areas such as: mental, psychological and physical health. Medical care – both qualitatively and quantitatively – has been negatively affected by persistent workplace stress and the burden of social responsibility. The significant factors for the expansion of psychosocial stress among the nursing group are numerous, but most prominent are - job strain, high intensity work and work dynamics, uncertainty and risky environment, external social pressure and perceived limitations to influence to the external factor COVID-19. As a key conclusion, it is possible to confirm in this case the theory of the increase of the harmful impact of stress from an external factor for the individuals and the society, where the possibility of impact is limited and creates an insurmountable conflict [1-3]. Herein lie the underlying sources – expansion in the scope of influence and negative impact of psychosocial stressors in the work environment, which have emerged as key among nurses practicing long-term care and life sustaining healing activities.

The aim of our study is to investigate and assess the effect of psychosocial risk factors on the functional status examined with arterial blood pressure of nurses working in hemodialysis during exposure to the COVID-19 pandemic. Two periods were compared: pre-COVID-19 (before the pandemic COVID-19: 2018 and 2019) and COVID-19 (during the pandemic situation: 2020).

## MATERIALS AND METHODS

### *Materials*

The study is observational. A study of psychosocial risk factors in medical, nephrology nurses from six hemodialysis centers and clinics was conducted from

November 2018 to February 2019 – Pre-COVID-19 period. The study included 68 nurses with mean age of 42.2 ( $42.2 \pm 10.81$ ) from different hemodialysis centers in Bulgaria. All the 68 above-mentioned nurses from the centers situated in the cities of Burgas, Pleven, Plovdiv and Sofia took part in the study during the pre-COVID period, and 45 of them participated during the pandemic of COVID-19. In the period before the COVID-19 pandemic, 68 nurses who completed occupational stress assessment questionnaires between November 2018 and February 2019 were studied to investigate psychosocial risk factors in the work environment. During the period of the COVID-19 pandemic, the 45 nurses completed the occupational stress assessment questionnaires between May and November 2020. After examining the psychosocial factors, a study of the functional status was conducted by studying the response of arterial systolic and diastolic pressure using a sphygmomanometer. The nature of the nurses' work activity consists of permanent, specific, long-term and continuous care of patients with Chronic Kidney Failure (CKD). The psychological burden of hearing about the patient's personal experience with the illness and providing logistical support for the diseased is enormous for the nurses.

### *Methods*

#### *NIOSH methodology for the assessment of occupational psychosocial stress*

The method for the assessment of occupational psychosocial stress was applied using the NIOSH questionnaire, which was validated and adapted for Bulgarian conditions and language [4]. The Bulgarian version of the questionnaire meets all scientific requirements and is in line with studies conducted in the field. With its help and using Karasek's model [5, 6] four groups of work situations can be identified by combining the significant psychosocial factors: job demands and control over the work process. The following scales of the psychosocial stress questionnaire were investigated: workload; job demands; control over the work process; cognitive skills; extra-work activities; social support from immediate supervisor, colleagues and family; self-esteem in relation to work; psychosomatic complaints.

The method used to assess occupational psychosocial stress is through the NIOSH questionnaire [7, 8], which analyzes and evaluates those factors in the individual's professional (work) environment, that are subjectively perceived and experienced as stressful. The methodology reflects the individual's self-assessment of the characteristics of psychosocial factors in the worker's work environment. The tool includes the following six groups of scales: work stressors; factors outside of work; individual factors;

buffering factors; short-term psychological, physiological and behavioral reactions; long-lasting psychological, physiological and behavioral reactions.

The NIOSH questionnaire is divided thematically into 8 (eight) parts, examining psychological and psychosocial factors from the working environment: 1. Assessment of control capabilities – 16 questions; 2. Assessment of social support – 4 questions with 3 directions each; 3. Assessment of job requirements – 11 questions; 4. Assessment of workload and responsibilities – 11 questions; 5. Assessment of mental requirements – 5 questions; 6. Assessment of self-esteem in relation to work – 10 questions; 7. Assessment of general health status – 17 questions; 8. Extracurricular activity – 7 questions

Self-assessment in different ratings for individual questions varies on a scale from 1 – „very little“ to 5 – „too much“. The thematic division of the NIOSH questionnaire is related to the need for a comprehensive analysis and subsequent assessment of workplace stress and related psychosocial risk factors. Subjective assessment by medical professionals under study is important and constructive in terms of statistical analysis and reliability to detect and characterize objective stressogenic catalysts.

The amount of questions and their individual and subjective assessment is pre-selected to be able to compile and analyze a personal assessment by categories to build the statistical analysis for the study of stressors.

#### Arterial systolic and diastolic blood pressure measurement using a sphygmomanometer

Systolic and diastolic blood pressure were measured using a sphygmomanometer [9]. The measurement of systolic and diastolic arterial pressure was in accordance with the European Classification for the Study and Reference of Arterial Pressure and the Definition of Arterial Hypertension Categories [10].

#### Data Analysis

The shapes of the frequency distributions were verified using the Kolmogorov-Smirnov one-sample test. Comparison between two independent groups was performed using t-test or Mann-Whitney test. The relationship between two categorical variables was examined using the Chi-square test. The level of significance assumed was  $\alpha = 0.05$ . The corresponding null hypothesis was rejected when the p-value is less than  $\alpha$ . SPSS version 13.0,

a specialized statistical package, was used to process the study data.

## RESULTS

This article focuses on the study of the effect of psychosocial stress on functional status examined with the response of arterial blood pressure in nurses practicing long-term care in hemodialysis clinics and centers in the context of COVID-19 pandemic in Bulgaria. To accomplish the aim, a study was conducted to assess psychosocial risk factors, and arterial systolic and diastolic blood pressure in nurses from different hemodialysis centers and clinics.

This article does not focus on the full multifaceted and extensive analysis of the research conducted on the impact of psychosocial stress. The data available are in the period before the pandemic (pre-COVID-19) and are compared with data during the pandemic (COVID-19 period) in the same nurses. It is interesting to note that all nurses were female and their positive and voluntary attitude towards the present study was higher before the pandemic setting. This can be explained by high workload, increased stress in the work environment, pressure of social factors and finally low levels of positivity. Of the 68 nurses who participated in the study during the pre-pandemic period, 66% or 45 participated during the COVID-19 period. A t-test for linked samples was used to compare the mean values of the various indicators between 2018 and 2019, and 2020. The results of the analysis of psychosocial factors and arterial blood pressure are presented in Table 1.

**Table 1.** Mean values of psychosocial factors, and arterial systolic and diastolic pressure

Indicator	N	Mean	SD	P
Control 2018 and 2019	45	3,21	0,69	< 0,001
Control 2020	45	2,35	0,37	
Social Support 2018 and 2019	45	3,55	0,85	< 0,001
Social Support 2020	45	3,98	0,53	
Job Requirements 2018 and 2019	45	3,74	0,56	0,716
Job Requirements 2020	45	3,70	0,52	
Workload and Responsibilities 2018 and 2019	45	3,26	0,50	0,804
Workload and Responsibilities 2020	45	3,28	0,33	
Mental Requirements 2018 and 2019	45	3,27	0,69	0,050
Mental Requirements 2020	45	3,12	0,50	
Confidence 2018 and 2019	45	2,93	0,40	0,674
Confidence 2020	45	2,90	0,33	
General Health 2018 and 2019	45	1,82	0,59	0,169
General Health 2020	45	1,68	0,41	
Blood Pressure Systolic – 2018 and 2019	45	124,87	17,02	< 0,001
Blood Pressure Systolic – 2020	45	129,40	12,89	
Blood Pressure Diastolic – 2018 and 2019	45	82,42	12,31	0,799
Blood Pressure Diastolic – 2020	45	82,73	9,70	

The table shows that nurse's control had significantly lower average levels during the COVID-19 period compared to the pre-COVID-19 period (2.35 versus 3.21),  $p < 0.001$ . Levels of social support increased significantly in the COVID-19 period, compared to the pre-COVID time (3.98 versus 3.55),  $p < 0.001$ . The COVID-19 period is characterized by significantly higher systolic blood pressure levels on average in comparison to the pre-COVID-19 period (129.4 vs 124.87),  $p < 0.001$ . For the remaining parameters, no significant difference was demonstrated between the two periods compared ( $p > 0.05$ ).

## DISCUSSION

Exposure to COVID-19 in Bulgarian medical professionals including the nurses in our study, who practice long-term care in hemodialysis clinics and wards, has become a powerful stressor affecting and altering the functional physiological and psychological state of the individual. The results indicated that there is an expansion of the level of psychosocial stress in the COVID-19 period compared to the pre-COVID-19 period. Our findings show a significant increase in systolic blood pressure and impact on psychosocial risk factors as social support increased and at the same time the level of control decreased due to the impact of COVID-19 situation during the COVID-19 period compared to the pre-COVID-19 period. In nurses, the COVID-19 period was characterized by significantly higher systolic blood pressure levels on average. The diastolic blood pressure does not change its level in the COVID-19 period, but along with the systolic blood pressure value forms the category of normal blood pressure and normal hypertension – one degree but still higher than the optimal blood pressure and hypertension according to the European guidelines for reference values of blood pressure and hypertension level. Psychosocial risk factors also respond sensitively to exposure to the stressor risk factor, COVID-19. The nursing profession has relatively high and stable levels of control. But our study shows that nurses working in hemodialysis centers have significantly lower average levels of control during the COVID-19 period compared to the pre-COVID-19 period, which is a serious predictor of increased psychosocial strain and stress in the workplace. Levels of social support increased significantly during the COVID-19 period relative to the pre-COVID-19 one, indicating that increased levels of social support have a beneficial buffering effect on the functional state of the nurses' body by reducing and neutralizing the effects of stress induced by COVID-19.

Understanding the importance and value of nurses' work has increased and taken its necessary place in the risk environment. Trust and support for nurses has increased and improved. Job requirements and responsibilities – by their nature have not changed, except that new and higher hygiene requirements have been added that are relevant to increasing the quality of nursing work and care. The workload and responsibilities maintain their standard levels in hemodialysis centers due to the nature of the illness of patients with CKD who require care for their underlying chronic illness. Cognitive mental demands demonstrate that the pandemic setting has not affected the level of mental demands required, according to the nurses interviewed. Despite their increased knowledge and new hygiene standards, no progression was reported on this index. Self-esteem, another psychological factor, did not show a significant change in the levels during the two periods considered, which is viewed as not a surprise, due to the traditional modesty of the Bulgarian nurse. The nurses' general state of health was subjectively evaluated as close to the levels of the pre-COVID-19 period and with no apparent change.

The strain on nurses at all levels has changed in intensity and they have had to work under new psychosocial stresses such as the COVID-19 situation. Researchers from around the world have turned their attention to this new psychosocial risk environment and results of studies conducted have shown that new high rates of burnout, post-traumatic stress syndrome and impaired mental and psychological health [11-13]. Other author teams from almost all countries have started active studies in this area because the impact and effect of this new stressor is visible and obvious. For example, Chinese research team stated that psychological stress among health care workers during the active part of the pandemic was significantly increased by 51%, and study participants possessed depression, anxiety and fear [14]. The result of our study show that the effects of workplace stress not only affect the quality of nursing work, but also are a prerequisite for strong psychological pressure on nurses who experience deep emotional conflict from the inability to respond adequately and quickly against this new external stressor and impact the functional physiological state of the body. Different authors, using different approaches, have identified profound and intense psychological and emotional changes in the health and social adequacy of nurses in the face of a pandemic [15-17].

Naturally, the focus of public opinion has concentrated on the nursing professionals at all levels of the healthcare system, where this interest and curiosity

has greatly increased stressogenic levels in individual and institutional aspects. Until now, no such interest and no such sustained strain has been observed on the peacetime nursing workforce. On the other hand, workplace and non-work-related stress peaked and maintained high levels for the second year, which is a prerequisite for a strong and negative impact on the health status of the individual. When compared with similar studies, the results are like ours, but differ in terms of status and self-esteem, which is indicative of Bulgarian medics and their worldview [18, 19]. In line with the WHO recommendations on psychosocial strain and mental health of physicians during a COVID-19 pandemic [20], it is necessary for nurses themselves to pay attention to their personal mental and physical health, but we as a society also have a duty to help and preserve this valuable resource for a long time.

On 13.3.2020, the government of Bulgaria declared a state emergency and the growth of the infected with the virus rose sharply. Our health system faced a new challenge of treating the sick and providing beds, doctors, nurses and ventilators. The main efforts were twofold – protecting the health of citizens and chronically ill patients, preventing the spread of the virus and actively treating the infected. The COVID-19 pandemic has largely disrupted the established way and stereotype of living. The deleterious effects of this insidious disease include high levels of illness and spread, significantly high and unexpected mortality of those infected, economic hardship and financial disruption for the individual as well as for organizations and the society as a whole, stress on the entire eco system of health and social development, high levels of stress associated with partial knowledge and partial credibility of information about and from the disease and a dominant fear of varying intensity of the impact of the virus and the behavior of health care institutions.

The dynamics of modern society affected the people by accelerating the work processes and increasing the adaptation, work, cognitive and communication demands on workers. A logical negative effect of the rapid dynamics of professional and social living is the increasingly rapid erosion of the functional state and attrition of workers. Therefore, work factors, psychological risks of the work environment and occupational safety have taken a leading role in research and integrated management practices and strategic imperatives for sustainable collective development. Changes in the very structure and intensity of living are at the heart of the changed nature of work activity [21]. This calls for a new attitude and a new, different and up to date reading of the psychosocial

risk factors of the working environment. The new understanding and contemporary assessment of the psychosocial factors of the work environment and their associated health risks have attracted the attention of researchers. One of the reasons for this is their key importance to health and this has clearly emerged in our new technology-based way of communication, COVID-19 regulated world [22]. According to the WHO, health is defined as a state of physical, mental and social well-being [23]. Following this postulate, it implies the creation of prerequisites and working conditions in which it is impossible to detect the presence of somatic and mental disorders and/or diseases. Moreover, the key requirement is to establish sustainable rules, norms and programs to prevent the harmful effects of the nature of the work process on the health of employees and workers. The main objective is not only to preserve and prolong an active working life, but also to enhance performance and satisfaction – a sense of significance and mental health. Therefore, an essential part of the WHO definition of health is also providing the opportunity to recover and to enhance cultural and intellectual levels. In summary, it is possible to argue that the state of health is a continuous process of full adaptation of the organism to changing environmental and working conditions [9, 10]. Paying attention to the working capacity and the continuous efficiency of working life, the factors of working environment and work have been identified, which have the main influence with different strength, exposure and intensity on mental and physical health. The etymology of these factors as well as their characteristics and effects on health has been the subject of various studies and research. Researchers seek not only to systematize and expose them from all possible sides, but also to find ways of prevention and conditioned awareness of their harmful effects. It is difficult to summarize or rank in order of value and importance which are the leading factors, because as technology and ways of working have advanced, safety and health have been at the forefront and subject not only to scrutiny but also to social evaluation.

Research and management interest has recently been attracted by psychosocial risk factors of the work environment. On the one hand, this is a logical consequence of the established and nurtured focus on the individual and his or her comprehensive, multifaceted and holistic health as a key to society and a measure of European belonging. On the other hand, it is an expected effect of the natural evolution of social, labor and economic life with all the dynamics of its multi-segmental comprehensiveness. There is an opinion of a diverse range of authors [24-26]

that psychosocial risk factors have a more significant and deeper effect on the development of diseases compared to physical factors. The relevance of their thesis applies largely to the next generations of workers, the main reason being the dynamic lifestyle and the resulting stress in the new style of living [27]. In the dynamics of what is happening and in the presence of a pandemic with a new biological agent, their visionary thesis is a reality among the leading and relevant today, the highest stress profession of medical professionals. The new extremely key role with intense health significance of psychosocial factors can be found in various spheres of the social, cultural and economic life of our modern information dependent COVID dynamic society. Therefore, psychosocial risk factors and their intense health impact are counted among the direct factors of work activity [4]. Evidence of the increased interest of researchers, theorists and practitioners are the increasing number of studies, articles and monographs [28-30], where the object of research is precisely the effects of their severity on health, the root causes and consequences of the disposition by and of psychosocial factors.

### CONCLUSION/IMPLICATIONS

The results of our study discussed the comparison of data from the two periods help to form the conclusion that the COVID-19 pandemic in nurses practicing long term care in hemodialysis clinics and wards represents a powerful stressor, significantly affecting the functional, physiological and psychological state of the studied individuals.

The analysis of the survey data on the impact of psychosocial stress among nurses practicing long term care in hemodialysis clinics and wards is indicative of the nature of the stress – before and during the COVID-19 pandemic, as well as the nature of the profession and the overall psychological attitude of the Bulgarian nurses. There is a need for more research and the embedding of psychosocial stress prevention policies where the main objective will be not only to preserve and prolong the working life of this social group of nurses, but also to reposition it as a leading, risky and significant one for public health and the economy. It appears that the COVID-19 “situation” will continue – it is not a sprint, but a marathon in which the fittest, the most prepared and the most supported finish.

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