

ORIGINAL ARTICLE

Work ability as a major determinant of clinical nurses' quality of life

Milan Milosevic, Rajna Golubic, Bojana Knezevic, Karlo Golubic, Marija Bubas and Jadranka Mustajbegovic

Aims and objectives. To examine quality of life determinants among clinical nurses in Croatia with an emphasis on their work ability.

Background. An important personnel management challenge is to explore factors that stimulate or hinder the development of individual work ability and quality of life throughout a career.

Design. A cross-sectional study.

Methods. The study was performed during 2007–2008 in six randomly selected hospitals in Croatia. The self-administered questionnaires included the Work Ability Index (WAI) developed by the Finnish Institute of Occupational Health, the Quality of Life questionnaire (WHOQL-BREF) developed by the World Health Organization and additional socio-demographic questions. A total number of 1212 nurses completed the questionnaires, giving a response rate of 67.3%. Binary logistic regression was performed to assess how socio-demographic characteristics and work ability groups predict each of the WHOQL-BREF domains.

Results. Having a satisfactory WAI score ($WAI \geq 37$) was significantly the most important predictor for all quality of life domains, with the odds ratios (OR) being as follows: OR = 6.8 (95% CI: 4.8–9.6) for the physical domain, OR = 2.3 (95% CI: 1.7–3.1) for the psychological domain, OR = 1.7 (95% CI: 1.3–2.4) for the social relationship domain and OR = 1.7 (95% CI: 1.3–2.3) for the environmental domain.

Conclusions. Satisfactory work ability was a major quality of life determinant in all WHOQL-BREF domains with the highest odds ratio for the physical domain. Maintaining clinical nurses' work ability is an important issue, because it is foundational for the quality of life of the workforce.

Relevance to clinical practice. Our study provides quantified estimates of the extent to which a satisfactory WAI score predicts a better score in physical, psychosocial, social relationships and environmental domain of nurses' quality of life. Therefore, maintaining or improving nurses' work ability remains the essential aim of hospital managers.

Key words: Croatia, nurses, nursing, quality of life, work force issues, workforce planning

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Introduction

Quality of healthcare depends on many factors, including health, quality of life and work ability of healthcare workers.

Globally, nurses are the largest category of health care workers in the world and provide up to 80% of direct patient care (WHO 2002). Large-scale epidemiological studies which aim to describe nurses' quality of life and its main

Authors: Milan Milosevic, MD, PhD, Research Fellow Assistant and Occupational Medicine Specialist, University of Zagreb, School of Medicine and Andrija Stampar School of Public Health, Zagreb, Croatia; Rajna Golubic, MD, PhD, Researcher, Institute of Public Health, Department of Public Health and Primary Care, University Forvie Site, Cambridge, UK; Bojana Knezevic, MD, PhD, Occupational Medicine Specialist, Croatian Institute for Occupational Health and Safety, Zagreb; Karlo Golubic, MD, Research Fellow, Clinical Hospital Center "Zagreb", Zagreb; Marija Bubas, MD, PhD, Occupational Medicine Specialist,

Croatian Institute for Occupational Health and Safety, Zagreb; Jadranka Mustajbegovic, MD, PhD, Full Professor, University of Zagreb, School of Medicine and Andrija Stampar School of Public Health, Zagreb, Croatia

Correspondence: Milan Milosevic, Research Fellow Assistant and Occupational Medicine Specialist, Department of Environmental and Occupational Health, University of Zagreb, School of Medicine and Andrija Stampar School of Public Health, Rockefellerova 4, 10000 Zagreb, Croatia. Telephone: +385 1 4590 167.

E-mail: milan.milosevic@snz.hr

determinants and to assess its associations with work ability and different health outcomes are needed to translate the research findings into evidence based strategies effectively with the final goal being to maintain work ability among nurses (Patrick & Erickson 1993). Nowadays, one of the most important personnel management challenges is to explore factors that stimulate or hinder the development of individual work ability and quality of life throughout a career. Maintaining clinical nurses' quality of life and work ability is an important issue, because it is the foundation for the well-being of the workforce.

Background

The health care system in Croatia, which is a post-communist transitional country, has recently undergone fundamental structural changes in its financing, organisation and ownership. According to the Croatian Health Service Yearbook for 2006 (CNIPH 2007), most of the nurses (over 80%) in Croatia work in secondary or tertiary care (i.e. hospital, clinical hospital centre or university hospital). The reforms of the Croatian health care system began in 1990 and quality of health care has been improved in accordance with the World Health Organization (WHO) and the European Union (EU) recommendations. Unlike most other countries in the central and eastern European Region, Croatia has sought reform through restoring some central control as well as strengthening the accountability of health care service providers. Croatia has a national nursing association and a system of registration for nurse certificates. The training of nurses has recently undergone significant changes. The minimum age of entry is now 18 and nursing education takes 3 years at college level. Recent reforms have also introduced postgraduate specialisation for nurses, in midwifery, paediatric nursing and mental health nursing. It is envisaged that the education reforms will lead to a higher income for nursing staff (Croatian Government 2004) and that the nursing profession will benefit from increased autonomy, increased number of qualified nurses and improved training. There are many overlapping, complex issues affecting nurses and their needs, issues that have to be considered and addressed to promote a healthier work environment, as well as a more humanistic environment (Mizuno-Lewis & McAllister 2008).

Work ability can be considered as an important component of the broader concept of employability. It also can be a sign of person's ability to cope with working life. The concept of work ability is defined as the ability of a worker to perform his/her job, taking into account the specific work demands, individual health condition, mental resources and work life (Ilmarinen & Rantanen 1999). More specifically, it is the

worker's perception of own work ability. Thus, work ability should be measured using multiple criteria. The Finnish Institute of Occupational Health developed one of the most appropriate instruments for measuring work ability: Work Ability Index (WAI) (Tuomi *et al.* 1997, Ilmarinen 2007). It has been translated into 21 languages, including Croatian (Pranjic *et al.* 2006) and is highly applicable for cross-cultural comparisons. The WAI is aimed at evaluating how well workers are performing in their present job and how their performance is expected to be with respect to future work demands, health and mental resources (Tuomi *et al.* 1997, Ilmarinen & Rantanen 1999). It has been reported that the WAI is a good indicator of the occupational factors for early retirement (Tuomi *et al.* 1991).

The WHOQOL-BREF was developed by the World Health Organization (WHO) in 1991 and it is available in 19 languages including Croatian (Orley *et al.* 1997, Power *et al.* 1998). This questionnaire assesses quality of life in a variety of cultures. It assesses individuals' perceptions in the context of their culture and value systems, their personal goals, standards, concerns, life satisfaction and subjective well-being. The WHOQOL-BREF is comprised of 26 items evaluating four domains: physical health, psychological health, social relationships and the environmental domain. The scores are transformed on a scale from 0–100 to enable comparisons to be made between domains composed of unequal numbers of items (WHO 1996). The aim of our study was to examine quality of life determinants among clinical nurses in Croatia with an emphasis on their work ability.

Methods

Setting

This study was conducted from October 2007 – May 2008 in six randomly selected hospitals in Croatia (County Hospital Varaždin, County Hospital Koprivnica, County Hospital Bjelovar, Clinical hospital for infectious diseases 'Fran Mihaljević', Special Hospital for Children with Psychomotoric Disorders 'Goljak' and Psychiatric Hospital 'Vrapče'). Hospitals were selected from Croatian Registry of Hospitals (CNIPH 2007) using computer software for randomisation (MedCalc Software version 10.0).

Ethical considerations

The relevant institutional ethics committee approved the current research. Furthermore, the institutional research board at each hospital gave an additional permission to carry out and publish the results of the study. Each

questionnaire was prefaced with the letter explaining the objectives of the study and assuring the respondents the anonymity and confidentiality of their response. Questionnaires were distributed in non-marked envelopes to each hospital department. All questionnaires were returned anonymously in sealed non-marked envelopes to protect participants' privacy. Participation in the study was voluntary.

Participants

During the period of the study, the selected hospitals employed 1800 nurses. All nurses who were working at clinical department as a staff or registered nurse were invited to participate in the study. Out of the 1800 nurses, 1212 completed the questionnaires, giving a response rate of 67.3%. Both surgical [general surgery, orthopaedic surgery, ear, nose and throat diseases (ENT), ophthalmology, gynaecology and obstetrics, maxillofacial surgery] and non-surgical departments (internal medicine, infectious diseases, neurology, dermatology, physical medicine and rehabilitation) were included.

Instruments

The self-administered questionnaire involved two parts with additional questions addressing socio-demographic characteristics. The first part assessed the work ability and the second part assessed the quality of life. The work ability was measured by the Work Ability Index (WAI) developed by the Finnish Institute of Occupational Health (FIOH) (Ilmarinen 2007). The quality of life was measured by the Quality of Life questionnaire developed by the World Health Organization (WHO 1996, Orley *et al.* 1997).

The WAI is a self-administered questionnaire derived as the sum of scores in seven items: subjective estimation of present work ability compared with lifetime best (0–10 points); subjective work ability in relation to both physical and mental demands of the work (2–10 points); number of diagnosed diseases by the physician (1–7 points); subjective estimation of work impairment due to diseases (1–6 points); sickness absenteeism during the past year (1–5 points); own prognosis of work ability after two years (1, 4 and 7 points); and psychological resources including enjoying daily tasks, activity and life spirit, optimistic about the future (0–4 points). The score derived from the WAI ranges from 7–49 and it is categorised into 1 of 4 categories: poor (7–27 points), moderate (28–36 points), good (37–43 points) and excellent (44–49 points). The reliability and validity of WAI was very well reported with Cronbach's $\alpha = 0.83$ (Tuomi *et al.* 2001). The test–retest reliability of WAI was also with

an acceptable reliability for the classification of a subject's work ability over a four-week interval (de Zwart *et al.* 2002). Moreover, significant correlations were found between the WAI scores and objective measurements, with $r = 0.32$ for muscular strength and $r = 0.37$ for endurance (Eskelinen *et al.* 1991).

The WHOQOL-BREF psychometric properties of the Croatian version questionnaire were comparable to the international study (Orley *et al.* 1997, Saxena *et al.* 2001, Skevington *et al.* 2004). Socio-demographic data included questions concerning age, gender, working experience, primary workplace (non-surgical or surgical department), education level, marriage, shift work (night shifts, work on weekends and 24-h on call), satisfaction with present work tasks, satisfaction with professional life, positive experience in professional life, career advancement and satisfaction with general health status.

Study variables

Satisfactory work ability was defined as all WAI score values equal to 37 and above. The data concerning WHOQOL-BREF was managed according to the WHOQOL-BREF scoring instructions preparatory to the statistical analysis (WHO 1996). The items were transformed to a linear scale (0–100), with 100 indicating the highest and 0 the lowest possible quality of life. The scale scores were not calculated if more than 50% of items in the scale were missing. Advances in professional career, positive experience in professional life, satisfaction with present work tasks are coded in Likert scale from 1 (poor experience or satisfaction) – 5 (excellent experience or satisfaction).

Statistical analysis

Descriptive statistics including frequencies, means, medians, standard deviation (SD), 25th and 75th percentiles (interquartile range) were calculated to describe data. Data distribution was analysed with the Smirnov–Kolmogorov test and according to the type of distribution, an appropriate parametric or equivalent non-parametric tests were used. Quantitative variables without normal distribution were shown as median and corresponding interquartile range. Since WAI score followed normal distribution, mean and standard deviation were used in description. Binary logistic regression was performed to assess how each of the WHO-BREF domains was predicted: predictor variables included socio-demographic characteristics and work ability groups (WAI score < 37 and ≥ 37). Dependent binary variables included quality of life domains individually coded '0' if score

is ≤ 60 and '1' if score is > 60 (Cummins 2000): subjects who had scores over 60 are included in group with satisfactory quality of life in corresponding domain. Areas under the ROC curve were calculated for all binary logistic regression models. Spearman's coefficients of rank correlation (ρ) were made to demonstrate the correlation between the WAI score and linear scale score of each WHOQL-BREF domain. Statistical software MedCalc (MedCalc Software version 10.0) was used for all statistical analyses; $p < 0.05$ was considered statistically significant.

Results

Socio-demographic characteristics, WAI and quality of life domain scores reported by clinical nurses are shown in Table 1. The median (25th–75th percentile) age of all participants was 42 (32–47) years. Sixty percent of all participants were under 45 years and 87.5% were female. Seventy-five percent of all participants were living with partner. The median period the participants had been working at the current workplace was 21.0 (12.0–28.0) years. Furthermore, 15% of all participants completed college education, whereas the remaining 85% completed only secondary school of nursing (Table 1). The lowest quality of life median (25th–75th percentile) score was noted

Table 1 Socio-demographic and other important characteristics of the investigated population: clinical nurses ($n = 1212$)

Variables	Statistics
Age (years); median (25th–75th percentile)	42.0 (32.0–47.0)
Years of practice; median (25th–75th percentile)	21.0 (12.0–28.0)
Female gender; n (%)	1061 (87.5)
Married (or living with a partner); n (%)	906 (74.8)
Primary workplace: non-surgical departments; n (%)	763 (63.0)
Primary workplace: surgical departments; n (%)	449 (37.0)
Higher education; n (%)	183 (15.1)
Shift work (including night shifts, work on weekends and 24 h on call); n (%)	580 (47.2)
Very or rather satisfied with present work tasks; n (%)	547 (45.1)
Positive experience in professional life; n (%)	908 (74.9)
Insufficient career progress; n (%)	920 (75.9)
Satisfaction with personal health; n (%)	697 (57.5)
Work ability score; mean \pm standard deviation	38.3 \pm 6.1
Quality of life, physical domain; median (25th–75th percentile)	71.4 (60.7–78.5)
Quality of life, psychological domain; median (25th–75th percentile)	70.8 (58.3–79.1)
Quality of life, social relationship domain; median (25th–75th percentile)	75.0 (58.3–83.3)
Quality of life, environmental domain; median (25th–75th percentile)	59.3 (50.0–69.7)

in environmental domain: 59.3 (50.0–69.7). All other domains have similar scores but the highest value was found in social relationship domain: 75.0 (58.3–83.3). Average (mean \pm SD) WAI score was 38.3 (SD 6.1). Having a satisfactory WAI score was significantly the most important predictor for all quality of life domains; with the odds ratios (OR) being as follows: OR = 6.8 (95% CI: 4.8–9.6) for the physical domain, OR = 2.3 (95% CI: 1.7–3.1) for the psychological domain, OR = 1.7 (95% CI: 1.3–2.4) for the social relationship domain and OR = 1.7 (95% CI: 1.3–2.3) for the environmental domain. Having a positive experience in professional life was also a significant predictor for all quality of life domains but with lower odds ratios than WAI. Higher educational level was a significant predictor for physical and environmental domain, male gender only for physical domain, younger age for social relationship domain, advances in professional career and satisfaction with present work tasks for environmental domain (Table 2). Area under the ROC curve (95% CI) of predictors model for physical domain was 0.8 (0.7–0.9) and for other domains nearly the same, around 0.7 (0.6–0.8). The strongest positive correlation was found between the WAI score and the physical domain score, Spearman's coefficient (ρ) = 0.629, $p < 0.001$. Positive Spearman's coefficients of rank correlation were also found between the WAI score and the psychological domain score (ρ = 0.387, $p < 0.001$), the social relationship domain score (ρ = 0.260, $p < 0.001$) and the environmental domain score (ρ = 0.335, $p < 0.001$).

Discussion

Main findings

In this study, we explored how the WAI among hospital nurses can predict their quality of life being defined by the four following domains according to the World Health Organization (WHO): physical domain, psychological domain, social relationships and environmental domain. We confirmed the hypothesis that satisfactory work ability (WAI > 37) significantly predicted a better quality of nurses' life in all four domains (Table 2), with the highest odds ratio (OR) for the physical domain. Positive experience in professional life was another variable which predicted significantly better quality of life, although ORs were lower than those for satisfactory work ability. Furthermore, higher education level was associated with significantly better quality of life in physical and environmental domain. Age was inversely associated with the score in social domain. Younger nurses may have better communication skills with patients and other health care workers which can lead to

Table 2 Predictors model for WHOQL-BREF quality of life domains among clinical nurses: binary logistic regression

Variables	Physical domain			Psychological domain			Social relationship domain			Environmental domain		
	OR	95% CI	<i>p</i>	OR	95% CI	<i>p</i>	OR	95% CI	<i>p</i>	OR	95% CI	<i>p</i>
Satisfactory Work Ability Index	6.82	4.83–9.63	<0.001*	2.26	1.68–3.06	<0.001*	1.73	1.27–2.37	<0.001*	1.69	1.27–2.25	<0.001*
Age	1.02	0.97–1.09	0.496	1.02	0.96–1.08	0.524	0.93	0.88–0.99	0.013*	1.02	0.97–1.07	0.481
Higher educational level	1.83	1.10–3.04	0.020*	1.10	0.73–1.65	0.658	0.70	0.47–1.05	0.082	1.50	1.04–2.17	0.029*
Male gender	2.16	1.18–3.95	0.012*	1.06	0.68–1.67	0.792	1.36	0.84–2.20	0.214	1.31	0.87–1.96	0.190
Advances in professional career	0.98	0.82–1.17	0.823	0.98	0.84–1.14	0.776	1.07	0.91–1.26	0.420	1.19	1.04–1.36	0.011*
Positive experience in professional life	1.35	1.15–1.59	<0.001*	1.44	1.25–1.66	<0.001*	1.41	1.22–1.63	<0.001*	1.38	1.19–1.59	<0.001*
Satisfaction with present work tasks	1.22	0.98–1.52	0.072	1.11	0.92–1.34	0.277	1.07	0.88–1.30	0.505	1.30	1.08–1.56	0.005*
Married (or living with a partner)	0.74	0.49–1.11	0.148	1.24	0.88–1.73	0.217	1.33	0.94–1.89	0.108	0.95	0.70–1.29	0.764
Working in shifts	0.90	0.65–1.24	0.530	1.01	0.76–1.33	0.969	0.88	0.66–1.17	0.384	1.18	0.92–1.52	0.200
Years of practice	0.97	0.91–1.03	0.308	0.98	0.92–1.03	0.397	1.05	0.99–1.11	0.083	0.98	0.93–1.03	0.459
Primary workplace: non-surgical departments	0.80	0.57–1.11	0.184	1.00	0.75–1.33	0.997	1.01	0.74–1.36	0.974	1.24	0.96–1.61	0.104
Area under the ROC curve (95% CI)	0.81 (0.74–0.86)			0.68 (0.65–0.71)			0.68 (0.67–0.71)			0.68 (0.66–0.71)		

*Statistical significance (two tailed).

this result. In addition, advances in personal career predicted significantly better quality of life in environmental domain. The WAI score and the quality of life were positively correlated in all four domains, with the highest value of Spearman's correlation coefficient for the physical domain.

The study population was predominantly female (87.5%), with the preponderance of married nurses (74.8%). Thus, conclusions as to gender differences or similarities in the observed parameters cannot be made. The median age of participants was 42 years and the median length of practice was 21 years. The majority of the nurses worked in non-surgical (63.0%), whereas the remainder worked in surgical departments. Fifteen per cent of the participants had a university degree, while the rest completed only secondary school. Approximately half of the study population worked in shifts. Three quarters of participants had positive experiences in professional life and equal proportion of participants reported insufficient career progress. The majority of investigated nurses were satisfied with their health. The average WAI score among all participants was satisfactory (>37). In addition, three of the four domains of the quality of life appear to be higher than 70% of the scale maximum. To make the comparisons of the quality of life scores possible, Cummins standardised the results on the scale 0–100% of the scale maximum and showed that the average results in the world population lie between 60–80% of the scale maximum

(Cummins 2000). The environmental domain of the quality of life had noticeably lower score compared to other domains.

Study strengths and limitations

The main strength of our survey is a fairly large sample size with acceptable response rate and homogeneous sample (gender and education) that allowed WAI and positive work experiences to emerge. The scales used were previously validated instruments that retained their psychometric properties in our population. Another strength is the fact that the study included hospitals being randomly chosen from the list of all Croatian hospitals, thereby representing different geographical regions.

There are several limitations to this study. First, the cross-sectional nature precludes an evaluation of temporal precedence and causality of the observed associations. The results suggest associated factors that may lead to better quality of life in the four domains. Second, the study was performed in hospital settings, which does not allow generalisation of our findings to nurses employed in other settings, such as public health nurses. Third, there may be a source of response bias, i.e. no conclusion could be drawn as to whether nurses who refused to participate in the study are more likely or less likely to have better quality of life or higher WAI score than nurses who participated.

Comparison with the literature

Similar studies examining work ability and quality of life among nurses were of comparable sample size (Chiu *et al.* 2007). Compared with the other countries, the average WAI score of British, German, Taiwanese nurses was 39.7, 37.9 and 38.4, respectively (Camerino *et al.* 2003, 2006, 2008, Chiu *et al.* 2007). A possible explanation for the differences in WAI among countries is heterogeneity in demographic structure, education system and working hours. Our study confirmed that satisfactory WAI score and positive experiences in professional life significantly predicted better quality of nurses' life in all observed domains which is consistent with the previous findings that job satisfaction is associated with physical working environment, psychological support at work, time to devote to sport and lifestyle (Camerino *et al.* 2006). The highest OR found for the physical domain may conceivably be a result of the fact that the majority of the points of the WAI score are determined by physical health, therefore higher WAI score appears to predict better quality of life in physical domain with higher estimated OR than for the other three domains. Our finding that higher education level predicts significantly better quality of life in the physical and the environmental domain is in line with the literature addressing that education and material deprivation may be strongly related to self-rated health (Bobak *et al.* 2000). In Croatia, better education, like in most countries, is associated with higher income (Cheeseman Day & Newburger 2002, Croatian Government 2004, van Doorslaer & Jones 2004) which could explain the higher score in environmental domain being predicted by higher education level. Also, additional education can facilitate access to supportive measures that in turn maintain good work ability. Similar explanation could be provided for advances in personal career as a predictor of better quality of life in environmental domain. In addition, older age was demonstrated to be a predictor of lower quality of life in social relationships domain. Since this domain covers satisfaction with oneself, personal relationships and satisfaction with sexual life, it is plausible to infer that these factors deteriorate with age. It is important to support nurses work ability effectively and systematically to allow them to stay employed until the normal retirement age (Naumanen 2006). There was an inverse association between shift work and social relationships and physical domain of the quality of life, however statistically insignificant (Table 2). In contrast, literature provides compelling evidence on disruption of circadian rhythm among nurses and other shift workers and consequences it could entail on their health (Sveinsdottir 2006, Barnes-Farrell *et al.* 2008). Finally, values of the area under

receiver operating characteristic (ROC) curve suggest that the prediction model in binary logistic regression was fair for all the four observed domains. The positive correlation observed between the WAI score and all four domains of the quality of life was in accordance with the study conducted in Taiwan. The difference in our findings is the strongest significant correlation being observed for the physical domain, whereas Taiwanese study showed the strongest correlation for environmental domain, which covers questions relating to healthy environment, leisure time, money, access to information, living conditions, transport and available medical services (Chiu *et al.* 2007). On the other hand, questions pertaining to the physical domain cover health, pain, medical treatment and capacity to work. Therefore, the difference might have arisen due to different importance of the four domains in self-assessment of the quality of life in two distinct cultures.

Conclusion

Satisfactory work ability was a major quality of life determinant in all WHOQL-BREF domains with the highest odds ratio for the physical domain. The environmental domain of the quality of life had noticeably lower score compared to other domains suggesting that working and living environment was below desirable values. Any positive change in that field should be useful. The average WAI score of Croatian clinical nurses was good and has to be, at least, maintained or improved. Maintaining clinical nurses' work ability is of great importance in the management of human resources in health care, because it is the foundation for the quality of life of the workforce and remains the essential aim of hospital managers.

Relevance to clinical practice

Our study provides quantified estimates of the extent to which satisfactory WAI score predicts better score in physical, psychosocial, social relationships and environmental domain of their quality of life and correlation between WAI score and quality of life. Therefore, maintaining or improving nurses' work ability remains the essential aim of hospital managers. A noticeable finding in this study is a small percentage of highly educated nurses. Considering the fact that education is associated with better health, better quality of life and better income, providing an opportunity for nurses' training and education would be of benefit in maintaining their work ability, thereby reflecting on the overall quality of healthcare in the hospitals. Other examples of the possible improvement in work ability include ergonomically designed tools and user-friendly software that

could decrease physical and mental demands, thus helping senior nurses in their adjustment to rapid advancement of technology and its results in their workplace. In addition, physical exercises in the workplace were proven to have a role in the prevention of early decline in WAI (Pohjonen & Ranta 2001). Physical activity may increase the person's capacities to cope with the demands of everyday life, but the pathways to global improvement of work ability or quality of life may be complicated as other factors also largely influence these concepts. As Croatia is still undergoing transition, healthcare system is affected by these changes as well as other segments of Croatian society. Improving nurses' quality of life is of great importance not only for themselves, but also for the entire society.

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Contributions

Study design: MM, RG, JM, BK; data collection and analysis: MM, RG, BK, KG, MB, JM and manuscript preparation: MM, RG, BK, JM.

Conflict of interest

Before, during, or after the study, none of the authors received any funds for their work, which was exclusively voluntary. All authors have stated that they have no conflict of interest.

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