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Original research article

Possible predictors of burnout among radiographers in Hungary: demographic and work related characteristics

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Abstract
Introduction: The risk of burnout in healthcare can affect the quality of patient care. The purpose of this study was to assess burnout rates among Hungarian radiographers to find out the possible reasons behind the phenomenon.
Methods: Quantitative, cross-sectional, descriptive data collection was conducted from June to September 2018. In addition to socio-demographic and work-related characteristics, an internationally validated Maslach Burnout Inventory (MBI) was used. Descriptive statistics, one-sample *t*-test, ANOVA, Mann–Whitney and Kruskal–Wallis test with 95% probability were used for statistical items (p = 0.05).
Results: We examined 238 radiographers' data with the mean age of 34.42 years (SD 10.53). Woman respondents dominated the sample but male respondents tend to be more affected by burnout (p = 0.001). Working over 50 hours per week affected negatively the dimensions of depersonalization and emotional exhaustion. 40 to 50 hours of work per week affected foremost the personal achievement dimension (p = 0.001). Radiographers working in oncology patient care are more affected by emotional exhaustion (p = 0.001). Respondents who rated their health as excellent had higher values of personal achievement (p = 0.01). They also had significantly lower levels of emotional exhaustion than respondents who considered their health status to be tolerable or poor (p = 0.001).
Conclusions: The extent of burnout may vary depending on the radiographers' work related characteristics. Understanding the risk factors associated with burnout may help us develop strategies for prevention.

Keywords: Burnout; Healthcare; Maslach Burnout Inventory; Radiographer

Introduction

According to the World Health Organization (WHO), "a healthy workplace is one in which workers and managers collaborate to use a continual improvement process to protect and promote the health, safety, and well-being of all workers and the sustainability of the workplace [...]" (Burton, 2010).

More than the daily stress we feel from work, burnout syndrome can have serious consequences on both our physical and mental health. Over time it can even lead to memory, attention, and emotional problems. Health care professionals are exposed to a variety of severe occupational stressors such as low social support at work, high workload, uncertainty concerning the patient treatment, and predisposition to emotional responses due to exposure to suffering and dying patients (Ruotsalainen et al., 2006; Sipos et al., 2017). Needless to say, the constantly changing environment and the working conditions in hospitals are becoming increasingly demanding and stressful, and stress is considered a risk factor for worker's health and safety. There's a difference between the kind of exhaustion you feel after a long day of meaningful work and the perpetual fatigue of burnout (Jasperse et al., 2014). The ongoing interaction between health care professionals and patients with their health-associated problems can expose these professionals to potentially more stress than other professions (Akroyd et al., 2002a).

Burnout

Freudenberger (1975) was the first to mention the term burnout in his observations of emotional depletion in people working in the health-related sectors.

Maslach et al. (2001) used the term burnout when they were expressing the emotion in the health sector workers when they were trying to investigate and explain the role of emotional exhaustion and depersonalization on healthcare workers.

Burnout is defined as a negative reaction to chronic work stress, in which individuals are exposed to prolonged stress due to a misfit between their needs and values and the job they perform (Maslach, 2003).

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Maslach Burnout Inventory survey

MBI is a three dimensional tool to assess burnout among workers. Three main dimensions form part of the syndrome (Maslach, 2003):

1. Emotional exhaustion; which means exhausted emotionally because of work.
2. Depersonalization; which is the impassive and impersonal response towards those receiving one's service, care, treatment or instruction, loss of any positive attitude towards ourselves, the world and others.
3. Personal accomplishment; which is reduced personal competence, feelings of frustration, anger, loss of self-esteem, desire to change or leave the job, and lack of successful achievement in one's work.

Researchers have been using the Maslach Burnout inventory MBI, which is a validation model, to assess these dimensions. They found that some of the reasons for radiographers and radiology technologist job dissatisfaction are: radiographers need to clarify their job description, the ambiguity of reporting channels and unclear job responsibilities which lead to the emotional exhaustion, depersonalization and personal accomplishment stages of burnout (Maslach and Jackson, 1981; Probst et al., 2012; Raj, 2006). In addition to the three dimensions of the Maslach burnout inventory, Hobfoll and Shirom (2001) have defined burnout by decreased enthusiasm about work, hopelessness, and feelings of entrapment.

Radiographers and work related stressors

The European Federation of Radiographers (2018) defines radiographers as 'medical imaging and radiotherapy experts who are professionally accountable to the patients' physical and psychosocial wellbeing, prior to, during and following examinations or therapy; take an active role in justification and optimization of medical imaging and radiotherapeutic procedures; and are key-persons in the radiation safety of patients and third persons in accordance with the "As Low As Reasonably Achievable (ALARA)" principle and relevant legislation (McNulty et al., 2016).

Researchers have found that the radiographers have a lower sense of achievement, underappreciated work, are undervalued by other radiology health caregivers. It has also been shown that radiographers reported low levels of self-achievement and feelings of subordination and paternalism (Singh et al., 2017). Radiographers have high levels of perceived stress and the major reason for this stress was overtime/on-call duties, radiographer-patient interaction, and high workload (Eslick and Raj, 2000; 2002; Singh et al, 2017). Other reasons that added to the sense of occupational stress among radiographers were; working in rotating shifts, exposure to the ionizing radiation, interaction with physicians, emergency trauma patients, and patient positions during the radiograph procedures. Occupational stress has been found to be a major risk factor for increased work errors, worker compensation claims, and burnout (Reingold, 2015).

Based on our current knowledge, the occupational burnout of specialists working in radiology departments in Hungary has not yet been assessed with the help of the standardized and validated Maslach Burnout Inventory (MBI) questionnaire. The aim of our research was to assess the level of burnout of the mentioned group of professionals, as well as to analyze the reasons related to the workplace characteristics behind the phenomenon.

Materials and methods

Our cross-sectional, descriptive research was carried out by purposeful, non-random sampling. The survey, which examined the burnout level of the radiology department workers, was approved and supported by the Hungarian Association of Radiographers. We used the e-mail addresses of nearly 3000 radiology department workers registered in the associations' system to send online questionnaires. In addition to the email addresses, the questionnaire was available from June 2018 to September 2018 in dedicated Hungarian professional groups of the most well-known community site. Apart from the basic socio-demographic data, no identifiable data were collected, and in addition to the socio-demographic characteristics, the questionnaire contained a number of work-related questions based on the viewpoints of other researchers (presence of side job, number of hours worked per week, number of night shifts taken etc.). The internationally validated Maslach Burnout Inventory is a freely available questionnaire used to assess the burnout of radiography professionals. Questions related to the respondents' health status were asked as described in the SF 36 questionnaire. Due to the sensitive and self-reflective nature of the survey, we paid special attention to the anonymity of the respondents during the course of the research.

Statistical analysis

Data processing was performed using SPSS version 24.0 statistical software. Descriptive statistics, one-sample *t*-test, ANOVA, Mann–Whitney and Kruskal–Wallis test with 95% probability were used for statistical items ($p = 0.05$).

Maslach Burnout Inventory

The 22-item questionnaire addresses the dimensions of depersonalization, emotional exhaustion, and personal accomplishment. For each item, on a 7-point Likert-scale, the respondent could indicate how specific the answer is to them. The scale values were: (1) never; (2) several times a year; (3) once a month; (4) several times a month; (5) once a week; (6) several times a week; (7) every day.

Low scores on personal accomplishment and high scores on emotional exhaustion and depersonalization may indicate different degrees of burnout.

In addition to the questions related to the abbreviated MBI, we also included a series of self-constructed questions that contained socio-demographic questions, which included questions related to workplace characteristics, family composition, and occupational qualifications.

Results

At the time of the survey, approximately 3,000 radiographers/radiographer assistants were members of the Hungarian Association of Radiographers. Of those, 404 radiographers/radiographer assistants completed the questionnaire – giving a response rate of 13.46% respectively. Respondents with educational qualifications lower than a Bachelor's degree were excluded from our study. After data clearance, we examined 238 radiographers' data.

Female radiographers dominated our cohort – with the mean age of 34.42 years (SD 10.53; youngest 22; oldest 61 years). More than half of the respondents live with their

spouse or with their children (n = 147) and almost two-thirds of the sample (n = 156) had no children at the time of the questionnaire. The majority of respondents were qualified to Bachelor's degree level (n = 227).

Alongside a full-time job, 18.5% of the sample (n = 44) had another job. Most of the radiographers (n = 169) work 40 and 50 hours per week, and almost half of the sample (48.3%) does not take nightshifts (Tables 2, 3).

Respondents had a depersonalization subscale mean score of 13.977 (SD = 6.6); 35.85 (SD = 12.8) for the emotional exhaustion subscale, and 40.14 (SD = 8.7) for the personal accomplishment subscale. Compared to the results of the Maslach Burnout Survey (includes physicians and nurses burnout scores), radiography practitioners showed higher values on the emotional exhaustion and depersonalization subscales (Maslach and Leiter, 2007). Examining the dimension of personal effectiveness, radiology professionals have better indicators. The slightly higher value on the personal accomplishment subscale is to be interpreted positively (Table 1).

Table 1. Frequency of MBI Subscale Burnout Scores for our respondents compared to the MBI Norms Sample

		(n =)	Depersonalisation Mean ± (SD)	Emotional exhaustion Mean ± (SD)	Personal accomplishment Mean ± (SD)
Current study	Hungary	238	13.97 ± (6.6)	35.85 ± (12.8)	40.14 ± (8.7)
MBI norms	USA	11 067	87 ± (5.9)	22.0 ± (10.8)	34.6 ± (7.1)

Gender played a significant role in the depersonalization and personal accomplishment dimensions, and male respondents tend to be more affected by burnout than woman. Respondents living with other family members/persons had significantly lower personal accomplishment values. Radiographers with no children seemed to be significantly affected by the depersonalization of emotional exhaustion. Radiographers with Master's degrees had a higher depersonalization median, but on the emotional exhaustion and personal accomplishment level, they had significantly better values than radiographers with a Bachelor's degree (Table 2).

Table 2. MBI Subscale Burnout Scores and respondents' demographic characteristics

	Depersonalization	Emotional exhaustion	Personal accomplishment
Gender			
Male (n = 45)	15.72 (SD = 4.84)***	32.49 (SD = 10.34)	37.95 (SD = 9.64)**
Female (n = 193)	12.33 (SD = 6.75)***	34.57 (SD = 13.36)	41.54 (SD = 8.44)*
Current family status			
Living with spouse (n = 101)	12.28 (SD = 5.43)	33.58 (SD = 13.20)	41.47 (SD = 8.25)
Living with spouse and children (n = 46)	12.75 (SD = 6.92)	35.32 (SD = 11.41)	41.82 (SD = 8.28)
Single (n = 74)	13.31 (SD = 7.50)	34.09 (SD = 14.09)	40.86 (SD = 8.73)
Living with other family member/ person (n = 17)	13.74 (SD = 7.53)	34.95 (SD = 12.98)	37.63 (SD = 10.80)*
Number of children			
One (n = 51)	12.16 (SD = 6.96)	32.96 (SD = 13.31)	42.18 (SD = 8.70)
Two or more (n = 31)	11.29 (SD = 6.37)	32,59 (SD = 12.97)	41.38 (SD = 9.89)
None (n = 156)	14.12 (SD = 6.36)***	36,04 (SD = 12.65)*	40.20 (SD = 7.81)
Highest degree			
Bachelor of Science – radiography (n = 227)	13.79 (SD = 6.60)	36.33 (SD = 12.76)**	39.86 (SD = 8.65)*
Master of Science – radiography (n = 11)	17.73 (SD = 5.40)*	25.91 (SD = 9.42)**	45.91 (SD = 8.24)*

* $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$.

Respondents with side jobs seemed more emotionally exhausted than only full-time workers. Working over 50 hours per week will affect negatively the depersonalization and emotional exhaustion dimensions, while working between 40 and 50 hours will have an effect on the personal accomplishment dimension well. The number of nightshifts doesn't affect the burnout scores of the sample significantly. Modalities do not have a significant effect on the samples' depersonalization level. Taking into account emotional exhaustion, radiographers who worked as radiotherapy personnel had the highest value. Radiographers working in angiography modality experienced their work to have the highest value – according to the personal accomplishment dimension (Table 3).

We were interested in how respondents perceived their health status, whether they had felt physical pain in the 4 weeks before completing the questionnaire, and how this subjective perception affects burnout and work performance. The majority of the sample rated their health status as good or very good (n = 92; n = 73). Physical pain within 4 weeks was not present in 84 cases, while 71 respondents reported moderate pain. The perceived physical pain did not have an effect on the work of the majority of the sample (n = 106) (Table 4).

Respondents with a subjectively assessed poor health status are most affected by depersonalization. Respondents who rated their health as excellent had a significantly higher level of personal accomplishment. However, they had significantly

Table 3. MBI Subscale Burnout Scores and radiographers' work related characteristics

	Depersonalization	Emotional exhaustion	Personal accomplishment
Side job			
Yes (n = 44)	14.91 (SD = 7.35) **	41.41 (SD = 12.95)***	39.42 (SD = 8.76)*
No (n = 194)	12.20 (SD = 6.27) **	32.20 (SD = 12.26)***	41.50 (SD = 8.64)*
Hours worked per week			
Lower than 40 hours (n = 51)	11.78 (SD = 5.79)	28.71 (SD = 11.95)***	39.90 (SD = 9.66)
Between 40 and 50 hours (n = 169)	12.80 (SD = 6.72)**	35.84 (SD = 12.58)***	41.94 (SD = 8.01)**
Over 50 hours (n = 18)	17.64 (SD = 7.14)***	43.32 (SD = 12.64)***	36,60 (SD = 9.45)
Number of nightshifts			
None (n =115)	12.29 (SD = 6.35)	35.17 (SD = 13.72)	41.65 (SD = 8.08)
1-3 (n = 60)	13.76 (SD = 6.83)	33.39 (SD = 12.79)	40.02 (SD = 8.80)
3-5 (n = 24)	13.40 (SD = 5.35)	36.53 (SD = 9.76)	40.86 (SD = 6.74)
5+ (n = 39)	12.76 (SD = 7.62)	34.64 (SD = 14.27)	40.65 (SD = 10.92)
Modality[1]			
Angiography radiographer (n = 14)	14.14 (SD = 7.04)	27.43 (SD = 13.26)*	48.07 (SD = 7.37)***
Non angiography radiographer (n = 334)	13.96 (SD = 6.58)	36.38 (SD = 12.61)*	39.65 (SD = 8.56)***
General X-ray radiographer (n = 87)	12.97 (SD = 6.48)	30.49 (SD = 12.20)***	40.60 (SD = 9.03)
Non general X-ray radiographer (n = 258)	14.55 (SD = 6.61)	38.94 (SD = 12.13)***	39.88 (SD = 8.56)
Ultrasound radiographer (n = 46)	13.70 (SD = 6.72)	31.11 (SD = 13.67)**	41.65 (SD = 10.40)
Non ultrasound radiographer (n = 299)	14.04 (SD = 6.57)	36.99 (SD = 12.35)*	39.79 (SD = 8.25)
CT radiographer (n = 51)	15.02 (SD = 6.38)	38.67 (SD = 15.69)	39.98 (SD = 9.24)
Non CT radiographer (n = 294)	13.68 (SD = 6.64)	35.09 (SD = 11.82)	40.46 (SD = 8.56)
MRI radiographer (n = 31)	13.29 (SD = 6.50)	38.58 (SD = 12.97)	41.71 (SD = 6.30)
Non MRI radiographer (n = 314)	14.07 (SD = 6.62)	35.44 (SD = 12.75)	39.91 (SD = 9.01)
CT and MRI radiographer (n = 55)	14.07 (SD = 6.83)	35.76 (SD = 11.01)	38.60 (SD = 9.51)
Non CT and MRI radiographer (n = 290)	13.94 (SD = 6.54)	35.88 (SD = 13.32)	40.61 (SD = 8.43)
Nuclear medicine radiographer (n = 11)	13.55 (SD = 4.50)	31.18 (SD = 2.52)	38.64 (SD = 9.52)
Non-nuclear medicine radiographer (n = 334)	13.99 (SD = 6.69)	36.08 (SD = 13.05)***	40.22 (SD = 8.69)
Radiotherapy radiographer (n = 50)	15.30 (SD = 7.79)	42.94 (SD = 10.35)***	41.48 (SD = 6.69)
Non radiotherapy radiographer (n = 295)	13.62 (SD = 6.21)	33.97 (SD = 12.75)***	39.79 (SD = 9.16)

* $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$. [1] In case of modalities, several answers could be marked simultaneously.

lower levels of emotional exhaustion than respondents who considered their health status to be tolerable or poor.

The values of depersonalization and emotional exhaustion were the highest for those who had felt slight physical pain in the last four weeks, while the value of the subscale of personal accomplishment was highest in the group of those without physical pain.

Respondents who were somewhat influenced by physical pain at work were significantly affected by depersonalization and emotional exhaustion, and their personal accomplishment subscale score of reduced work efficiency was also lower (Table 4).

Table 4. MBI Subscale Burnout Score means and radiographers' subjectively rated health status

	Depersonalization	Emotional exhaustion	Personal accomplishment
How do you describe your health status?			
Excellent (n = 20)	13.65 (SD = 6.97)	27.60 (SD = 16.66)***	45.60 (SD = 8.38)**
Very good (n = 73)	11.48 (SD = 5.26)**	32.48 (SD = 10.93)	40.14 (SD = 6.84)
Good (n = 92)	14.35 (SD = 6.91)	36.07 (SD = 10.94)	40.37 (SD = 9.10)
Tolerable (n = 46)	15.13 (SD = 5.94)	43.15 (SD = 13.42)***	36.89 (SD = 9.68)*
Bad (n = 7)	19.71 (SD = 9.65)***	43.86 (SD = 11.92)***	40.00 (SD = 7.79)
What kind of physical pain have you had during the last 4 weeks?			
None (n = 84)	13.45 (SD = 7.31)	31.50 (SD = 12.26)	43.00 (SD = 8.03)**
Very slight (n = 43)	12.58 (SD = 5.53)	33.56 (SD = 11.66)	38.95 (SD = 8.95)
Slight (n = 27)	17.00 (SD = 5.32)**	44.37 (SD = 9.09)***	36.59 (SD = 8.33)
Moderate (n = 71)	14.13 (SD = 6.58)	38.58 (SD = 13.05)	39.29 (SD = 8.49)
Strong (n = 11)	15.27 (SD = 6.68)	39.18 (SD = 14.35)	36.18 (SD = 9.95)
Does physical pain affect your job?			
Not at all (n = 106)	13.61 (SD = 7.42)	33.40 (SD = 13.11)	42.05 (SD = 7.96)
A little bit (n = 69)	12.93 (SD = 5.98)*	35.64 (SD = 10.68)	39.14 (SD = 8.83)
Moderately (n = 35)	14.60 (SD = 6.15)	36.74 (SD = 12.64)	40.69 (SD = 9.15)
Fairly (n = 28)	17.11 (SD = 5.15)**	44.57 (SD = 13.31)***	34.71 (SD = 8.38)***

* $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$.

Discussion

Our research focuses on an area that has not been studied so far in Hungary. Medical imaging is used by many patients, from the slightest trauma to the follow-up of major surgeries.

Previous studies have used MBI to assess radiographer burnout in the emotional exhaustion dimension. In a study conducted by Akroyd et al. (2002b) in the US, it has been shown that radiation therapists have higher emotional exhaustion and depersonalization than the MBI norms. 53% of them have shown high emotional exhaustion, and 45% have shown high depersonalization – thus they exhibit high levels of the first two dimensions of burnout. On the other hand, 41% have shown high levels of professional accomplishment. In the same study, a comparison was made between radiotherapists and nurses. The results showed that radiation therapists have higher levels of the first two dimensions of burnout stages than nurses. However, the study showed that the radiation therapists exhibit lower levels of burnout due to personal accomplishment than the nurses.

Moreover, Sale and Smoke (2007) have examined the quality work-life (which included burnout among workers) in the cancer centers in Canada. The study included physicians, nurses, physicists, and radiation therapists. The results showed that burnout level is strongly correlated to the three dimensions of Maslach burnout inventory norms. As an example, 43% of the radiation therapists had high emotional exhaustion in the first year of the study – which rose to 55% in the second year. Meanwhile, 17% of the therapists reported a high rate of depersonalization in the first year – which rose to 30% in the second year. Finally, the results also showed that 24% of them reported low personal accomplishment in the first year – which rose to 29% in the second year.

The results also showed that the radiation therapist group was the most affected among the groups (Poulsen et al., 2014; Sale and Smoke, 2007). In our previously published results, we examined the effect of age and time spent in the health care sector on burnout. We found out that the group of workers who were 31–35 years old and those who spent 16–20 years in the healthcare system were considered to be the most compromised groups in all the three dimensions of burnout (Sipos et al., 2019).

A study by Jasperse et al. (2014) across New Zealand Radiation Oncology departments found that radiology therapists and radiology nurses have higher emotional exhaustion than physicians, oncologists, and radiologists. The study also showed that those who work in public health sectors have higher emotional exhaustion than those working in the private sector. The results show that high workload, the incidence of patients stressors and organizational stressors raise the level of emotional exhaustion. They also show that job satisfaction is associated with less emotional exhaustion, in terms of depersonalization. Less work experience, high workload, and the existence of emotional exhaustion resulted in more feelings of depersonalization.

In our study, radiographers who worked at the oncology department had significantly higher emotional exhaustion values [42.94 (SD = 10.35)] than those professionals who work at other modalities [33.97 (SD = 12.75)]. Radiographers working at radiation therapy departments treat patients with serious illnesses every day. Patients are usually treated for several cycles over long weeks. During treatment days, staff inadvertently come into personal contact with patients. Few patients with cancerous lesions recover. Closer contact with patients and causes of ongoing deaths may lead to increased personal fatigue in our sample.

In their study, Singh et al. (2017) found that the burnout levels of radiographers, sonographers, and radiologists had high burnout scores for emotional exhaustion. Radiographers have shown low levels of personal accomplishment (mean = 30.8) in comparison to MBI norms (mean = 34.6), as have sonographers and radiologists (mean = 33.3, 32.9). The article also evaluated that there is a significant effect of working hours and student training on the radiographers' and sonographers' burnout levels. Radiographers and sonographers who work more than 10 hours (with overtime) recorded higher levels of emotional exhaustion, depersonalization and lower levels of personal accomplishment in comparison to those radiographers who work fewer hours.

In her study, Reingold (2015) found that the source of radiology technologist stress were long working hours, inconsistent management, poor communication, excessive workload, lack of work breaks, time pressures and conflicting demands. According to the authors' findings, those factors have a direct relationship with emotional exhaustion, depersonalization, and personal accomplishment.

Our mean values on the subscale of depersonalization and emotional exhaustion were higher than MBI norms. Radiographers who work more than 50 hours per week are more exposed to the dimensions of depersonalization and emotional exhaustion in terms of working hours (p = 0.001; p = 0.001). Increased work makes radiographers more irritable. This also results in a lack of diversity in their daily routine, which is confirmed by our results. Radiographers who work more than 50 hours a week also have a lower sense of personal accomplishment compared to those who work 40–50 hours.

Another study (by Daugherty, 2002) has indicated that the occupational burnout among sonographers and vascular technologist arises from the fact that they are expected to do more tasks with less available resources. This is due to labour shortage within the health care profession, which is a by-effect of profit-based mentality.

Emotional exhaustion has been shown to have a positive correlation with the number of scans per week and workplace characteristics. Sonographers and vascular technologists who work in hospitals have shown higher emotional exhaustion than those who are working in private offices. The depersonalization factor has been shown to correlate with gender – men were described with higher depersonalization values.

In our sample, female respondents dominated. Considering the three dimensions of burnout, men are more at risk based on the results of the depersonalization subscale (p = 0.001). Female respondents receive more positive feedback from their work, which is reflected in the increased value of personal accomplishment subscale (p = 0.01). Regarding emotional exhaustion, we did not find a significant relationship between gender and burnout.

The study of Daugherty (2002) found higher personal achievement among sonographers and vascular technologists working in private offices – compared to those who are working in hospitals. When the radiographers quit their jobs due to workload and burnout, the workers who remain express more stress and exhaustion - which leads to job dissatisfaction, higher turnover, and lack of commitment (Daugherty, 2002; Maslach and Leiter, 2007).

In addition to Maslach's three dimensions of burnout, several reasons have been found that lead to occupational burnout among radiographers. These have been named in previous studies as long working hours, support of colleagues, family

and friends' motivation, job satisfaction, the degree of decision-making and engagement, career development, boundary extension, leadership style, night shifts, inadequate pay, lack of respect, lack of staff, uncooperative radiologist, and non-supportive radiologist (Jasperse et al., 2014; Killion, 2009; Raj, 2006).

Crosby (1987) found that burnout can be inhibited by praise, acknowledgment of worth, and recognition by supervisors. Akroyd et al. (2002a) stated that environmental stress, workload, and reassurance of worth have an impact on the emotional exhaustion - which will in turn affect the burnout.

How to avoid radiographers' burnout

Schneiderman et al. (2005) have suggested that stress-relief courses and interventional relaxation are important to minimize radiographers' stress and burnout.

Johnson et al. (2019) studied the burnout level among sonographers, the results indicate that the majority of them have reported moderate to high levels of emotional exhaustion and depersonalization. However, he also found that sonographers pointed out lower level of burnout when receiving training courses – which improve their skill in delivering difficult news.

From the point of view of burnout prevention, the solution can be organizational or individual. The health care system can provide better working conditions at the organizational level, help with work-related stress, and provide opportunities for continuous improvement. During the workflow of radiology departments, the importance of class meetings, and team discussions were neglected. Class meetings provide an excellent opportunity to, among other things, raise issues, discuss brainstorming or other problem-solving methods that take into account the views of almost any practitioner, and solve the problem (Regehr et al., 2014; Schneiderman et al., 2005).

Conclusions

According to our knowledge, our research focuses on an area that has not been studied in Hungary. Medical imaging plays a key role in every illness a patient can suffer from. To make the most accurate diagnosis, the radiology recordings must be of the highest level. Radiographers are highly involved in the diagnosis-making process as they are producing diagnostic images about the patients, however, continuous work can lead to burnout over time. The increased value of the dimensions of depersonalization and emotional exhaustion may be a warning signal for employers to provide better conditions for their employees. There are some ways to reduce workers' burnout rate by improving personal competencies as an individual, whether in university courses, research, education, or conferences. Our findings correlate well with the results of international researches, but in future our research must go deeper to explore the underlying causes more accurately.

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Conflict of interests

The authors have no conflict of interests to report.

Možné prediktory syndromu vyhoření u radiologů v Maďarsku: demografické a pracovní charakteristiky

Souhrn

Úvod: Riziko vyhoření ve zdravotní péči může ovlivnit kvalitu péče o pacienty. Účelem této studie bylo posoudit míru vyhoření u maďarských rentgenologů a zjistit možné příčiny tohoto jevu.

Metody: Kvantitativní, průřezový, popisný sběr dat byl prováděn od června do září 2018. Kromě sociodemografických a pracovních charakteristik byl použit mezinárodně uznaný Maslach Burnout Inventory (MBI). Pro statistické položky byla použita popisná statistika, *t*-test s jedním vzorkem, ANOVA, Mann–Whitneyův a Kruskal–Wallisův test s 95% pravděpodobností ($p = 0,05$).

Výsledky: Zkoumali jsme 238 rentgenologů s průměrným věkem 34,42 let (SD 10,53). Ve vzorku dominovaly respondentky, ale více postiženi syndromem vyhoření ($p = 0,001$) bývají respondenti mužského pohlaví. Práce přes 50 hodin týdně negativně ovlivnila dimenze depersonalizace a emocionálního vyčerpání. Práce 40 až 50 hodin týdně ovlivnila především dimenzi osobních úspěchů ($p = 0,001$). Radiologové pracující v péči o onkologické pacienty jsou více postiženi emočním vyčerpáním ($p = 0,001$). Respondenti, kteří hodnotili své zdraví jako vynikající, měli vyšší hodnoty osobního úspěchu ($p = 0,01$). Rovněž měli významně nižší úroveň emočního vyčerpání než respondenti, kteří považovali svůj zdravotní stav za přijatelný nebo špatný ($p = 0,001$).

Závěr: Rozsah vyhoření se může lišit v závislosti na vlastnostech radiologů, které souvisí s prací. Pochopení rizikových faktorů spojených s vyhořením nám může pomoci vyvinout strategie prevence.

Klíčová slova: Maslach Burnout Inventory; radiolog; syndrom vyhoření; zdravotnictví

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