

PREVALENCE AND CORRELATES OF BURNOUT IN PORTUGUESE RADIOGRAPHERS

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ABSTRACT

Background: Burnout syndrome, recognised by the WHO as an occupational problem, results from chronic stress in the workplace and significantly affects the health and professional effectiveness of healthcare professionals. **Objectives:** Study the associations between burnout levels, sociodemographic and work-related variables among radiographers, nuclear medicine and therapeutic radiographers in central Portugal. **Methodology:** Cross-sectional study with a sample of 85 participants (39.89 ± 11.96 years). The Copenhagen Burnout Inventory (CBI), validated for the Portuguese language, was used to measure burnout, and another questionnaire to evaluate sociodemographic and work-related variables. **Results:** No significant differences in burnout were observed between genders or experience. However, shift patterns are significantly related with burnout. Radiographers, in general, who had “fixed shift” showed significantly higher levels of patient-related burnout, compared to professionals with “mixed shift”. ($p=0.047$). According to the work type, radiographers expressed higher levels in the patient-related dimension, compared to nuclear medicine and therapeutic radiographers ($p=0.012$). **Conclusions:** Given the small sample size, results should be interpreted with caution. However, this study contributes to the identification of associations between the dimensions of burnout and some sociodemographic and work-related variables among radiology, nuclear medicine, and radiotherapy technicians. Further studies with larger samples are needed to consolidate the results obtained.

Keywords: Burnout, Radiographers, Work type, Shift Type.

1. INTRODUCTION

According to the WHO, burnout syndrome has been included in the 11th revision of the International Classification of Diseases (ICD-11) as an occupational phenomenon. In ICD-11, burnout is defined as a syndrome resulting from chronic workplace stress that has not been successfully managed, reduced professional efficacy, while it's a legitimate diagnosis for work contexts (WHO, 2019). ICD-11 came into effect in January 2022.

In 2005, Kristensen *et al.* highlighted that burnout goes beyond mere tiredness or exhaustion. A deeper understanding of this concept involves identifying fatigue and exhaustion attributed to specific areas of life, such as work, especially when it involves interactions with customers, which represent a more specific domain within the work context. These authors introduced a new tool for measuring burnout, the Copenhagen Burnout Inventory (CBI) (Moser, *et al.*, 2023).

The development of burnout syndrome has multiple causes and is associated with six main areas: work overload, which leads to exhaustion; lack of control, which can lead to an inability to

perform duties; a feeling of insufficient reward, leading to a devaluation of work; a lack of community, which can lead to situations of isolation; a lack of fairness, leading to inequalities in work overload; and, finally, a conflict of values, leading to actions that go against each individual's ethical principles. It should be noted that these different dimensions mentioned above are interlinked and can be drivers of burnout, arising progressively rather than immediately (Fonte, 2011; Gaston-Hawkins *et al*, 2020; Cunha, 2023).

In addition to this, burnout does not only affect the individual, but everyone around them, both inside and outside the organisation, such as families, patients and the healthcare system itself (Shanafelt *et al*, 2010).

Burnout can be associated with different symptoms, which can be divided into physical, psychological, behavioural, and defensive symptoms (Gonçalves *et al*, 2023).

Physical symptoms include constant and progressive fatigue, muscle pain, sleep disorders, headaches, gastrointestinal disorders and menstrual changes in women. Psychological symptoms include lack of attention/concentration, slow thinking, feelings of loneliness, low self-esteem, impatience and mistrust. Behavioural symptoms include neglect, irritability, increased aggression, inability to relax, and increased substance use. Finally, defensive symptoms include a tendency towards isolation, loss of interest in work or leisure, and absenteeism (Fonte, 2011).

Burnout is prevalent among radiographers and is strongly linked to work-related factors such as workload intensity, perceived stress, and job demands. A 2024 cross-sectional study of 322 radiographers in Saudi Arabia using the Maslach Burnout Inventory (MBI) and Perceived Stress Scale (PSS) found moderate to high levels of burnout, with emotional exhaustion and depersonalization particularly elevated and overall perceived stress scores indicating high stress risk (Arif, 2024). These findings underscore that radiographers are at substantial risk of burnout across multiple dimensions of the syndrome, including emotional depletion and reduced personal accomplishment, and highlight the influence of demographic and professional variables such as age, work type, and experience on burnout severity (Arif, 2024).

In addition to individual prevalence data, broader research indicates that workload, under-appreciation, and organizational stressors contribute to burnout and low job satisfaction among radiographers across systems. A 2025 international survey of radiographers in the UK, Ireland, and other countries reported moderate burnout levels, where excessive workload and feelings of under-appreciation were primary contributors to both emotional exhaustion and low job satisfaction (Kennedy *et al.*, 2025). Moreover, systematic reviews and literature reviews of occupational health challenges in radiography confirm that psychological stressors such as long shifts, time pressure, and inadequate support systems are key risk factors for burnout, suggesting that structural organizational interventions and targeted support are essential to mitigate burnout and improve workforce well-being (Shettigar *et al.*, 2025).

A study conducted by the Faro University Hospital Centre, in 2023, revealed that one of the groups at highest risk of burnout are healthcare professionals, with implications for both their professional well-being and patient care (Melo-Ribeiro *et al*, 2023).

The main objective of this study was to compare burnout levels (personal, work-related and patient-related) between groups, taking into account sociodemographic and occupational variables, using the Copenhagen Burnout Inventory (CBI), adapted and validated for Portuguese population.

2. MATERIALS AND METHODS

The data for this study were collected at hospitals in the central region of the country, through self-administered questionnaires completed by Radiographers (Rad), Nuclear Medicine Radiographers (NMR), and Therapeutic Radiographers (TR). The study was observational and analytical, with a cross-sectional timeline and a level II knowledge (descriptive-correlational). The study was approved by the Ethics Committee of the Polytechnic Institute of Coimbra (27/2025). The anonymity of all participants was preserved and regarding data confidentiality, this data was stored in a password-protected database.

The questionnaire was administered online and consisted of two parts. The first part assessed socio-demographic and employment status (age, gender, marital status, educational qualifications, professional category, place of work, work at other institutions, total weekly working hours, type of working hours, length of time in the profession, experience at the institution, experience at the service, last holiday period and, finally, respondents were asked to answer whether they had ever thought about changing their profession, institution or service in the last month).

In the second part, the CBI (Portuguese validation by Fonte, 2011), a nineteen-question instrument developed to measure burnout in different areas. The CBI has three dimensions: Personal burnout (assesses the degree of physical and psychological exhaustion experienced by the person), work-related burnout (analyses the degree of physical and psychological fatigue and exhaustion perceived by the person in relation to their work) and patient-related burnout (assesses the degree of physical and psychological fatigue and exhaustion perceived by the person in relation to the work performed with patients). The authors emphasize that the CBI was designed mainly for group-level comparisons in epidemiological and occupational studies, rather than for clinical diagnosis. Therefore, the classification ranges used in the literature are interpretative thresholds rather than official diagnostic cut-offs. However, a common approach in occupational health research is to consider scores ≥ 50 as indicating a significant level of burnout. In the present study CBI is used for group-level comparisons.

This self-administered questionnaire was distributed by professional associations via a Google Forms link.

All Radiographers working in healthcare facilities in the central region who agreed to respond to the questionnaire were included in this study. With regard to exclusion criteria, interns and those who did not respond to the entire questionnaire.

The data was analysed using IBM SPSS version 29 software. With regard to statistical procedures, we used the following tests: Student's t-test for two samples; Mann-Whitney U test; ANOVA I Factor; Kruskal-Wallis H test; Pearson's linear correlation coefficient and Spearman's ordinal correlation coefficient.

For statistical inference, a confidence level of 95% was assumed for a random error less than or equal to 5%.

3. RESULTS

3.1 SAMPLE CHARACTERISATION

According to Table 1, the sample consisted of 85 Radiographers (Rad, NMR, TR), 67 of whom were female (78.8%) and 18 male (21.2%). These professionals are aged between 22 and 64, with an average age of 39.89 (SD=11.96).

Table 1: General characteristics of the sample

		n	%
Gender	Female	67	78.8%
	Male	18	21.2%
Age	Minimum – Maximum	22 – 64 years	
	M ± SD	39.89 ± 11.96 years	
Work Type	Radiographers	70	82.4%
	Nuclear Medicine Rad	5	5.9%
	Therapeutic Rad	10	11.8%
Shift Type	Rotating shift	57	67.1%
	Mixed shift	17	20.0%
	Fixed shift	11	12.9%
Experience	Minimum – Maximum	0.33 – 39 years	
	M ± SD	16.24 ± 11.69 years	

Legend: M (Mean) ± SD (Standard deviation)

Considering work type, 82.4% are radiographers. Regarding schedule type, 67.1% of professionals worked rotating shifts and 12.9% worked fixed hours. With regard to experience, this varied between 4 months and 39 years of experience, with an average length of service of approximately 16 years.

3.2 SOCIOPROFESSIONAL FACTORS AND THEIR ASSOCIATION WITH BURNOUT

Table 2 presents data on the three dimensions of burnout according to gender. According to the table above, there were no significant differences in burnout levels between the groups ($p > 0.05$). However, although no differences were observed, it was found that, on average, the female group of healthcare professionals had a higher rate of personal and work-related burnout. The opposite was true for the patient-related burnout index.

Table 2: Assessment of burnout levels according to gender

		n	M	SD	t; gl; p
Personal Burnout	Female	67	57.34	16.67	-1.712; 83; 0.091
	Male	18	50.00	13.93	
Work-related burnout	Female	67	55.65	16.36	-1.147; 83; 0.255
	Male	18	50.80	14.26	
Patient-related burnout	Female	67	40.55	21.10	-0.949; 83; 0.345
	Male	18	45.60	15.36	

Legend: M (Mean) $\pm$ SD (Standard deviation)

One of study aims was to analyse the relation between burnout and shift work type (table 3).

Table 3: Burnout levels according to Shift Type

		n	M	SD	z; p
Personal burnout	Rotating shift	11	59.47	16.47	0.364; 0.696
	Mixed shift	57	55.56	15.58	
	Fixed shift	17	54.17	19.21	
	Total	85	55.78	16.33	
Work-related burnout	Rotating shift	11	58.12	14.20	0.550; 0.579
	Mixed shift	57	54.82	15.40	
	Fixed shift	17	51.68	19.15	
	Total	85	54.62	15.98	
Patient-related burnout	Rotating shift	11	51.14	25.14	3.167; 0.047
	Mixed shift	57	42.47	19.29	
	Fixed shift	17	32.60	16.15	
	Total	85	41.62	20.05	

Legend: M (Mean) $\pm$ SD (Standard deviation)

Analysis of Table 3 shows that professionals with fixed working hours express higher levels in the three dimensions (personal, work-related and patient-related). It was also found that this difference is statistically significant in patient-related burnout ($p=0.047$). Professionals who had fixed shift showed significantly higher levels of patient-related burnout compared to professionals with mixed shift.

We sought to study the development of burnout in Rad, NMR, and TR as a function of the experience. It was found that regardless of the number of years in the profession, no correlational pattern was detected with the different dimensions of burnout assessed (*Personal Burnout*: $r_s = 0.132$; $p = 0.228$; *Work-related burnout* $r = -0.195$, $p = 0.389$; *Patient-related burnout* $r_s = -0.079$; $p = 0.473$).

Finally, we sought to assess whether the manifestation of burnout in Rad, NMR, and TR varies according to their area of practice (tabela 4).

Table 4: Burnout levels according to Work Type

		n	M	SD	F; df; p
Personal Burnout	Radiographers	70	56.845	16.036	1.40; 2; 0.497
	Nuclear Medicine Rad	5	53.333	18.727	
	Therapeutic Rad	10	49.583	17.508	
Work-related burnout	Radiographers	70	55.612	15.329	1.26; 2; 0.532
	Nuclear Medicine Rad	5	53.571	21.428	
	Therapeutic Rad	10	48.214	17.996	
Patient-related burnout	Radiographers	70	44.345	19.219	8.91; 2; 0.012
	Nuclear Medicine Rad	5	35.833	25.954	
	Therapeutic Rad	10	25.417	15.890	

Legend: M (Mean) $\pm$ SD (Standard deviation)

It was found that levels of personal burnout ($p=0.497$) and work-related burnout ($p=0.532$) are similar in different work type. However, there is a statistically significant difference in levels of patient-related burnout according to work type ($p=0.012$).

The Radiographers showed higher levels in all three dimensions (personal, work-related and patient-related). However, it was found that the difference between work type is more pronounced in patient-related burnout. Radiographers have the highest average (44.345), followed by NMR (35.833) and finally TR (25.417).

4. DISCUSSION

According to our findings, no statistically significant differences were observed between the levels of burnout among male and female professionals. Despite these results, a higher average value was found in the levels of personal burnout and work-related burnout in women, when compared to men. These indicators were similar to those found in studies on burnout in other health professionals, such as Portuguese nurses and doctors (Lapa *et al*, 2018; Nobre *et al.*, 2019; Martins & Veiga-Branco, 2024).

In our study, the average value for patient-related burnout was also higher in men, although the differences were not significant. A study conducted by Fernandes (2021) also demonstrated this trend in the male group of healthcare professionals during the pandemic.

As for shift work, the results obtained were analysed and it was found that fixed shift presented higher levels of burnout compared to other types of schedules. These results can be explained by the monotonous routine associated with fixed schedules, which can cause psychological exhaustion and less flexibility to manage personal life. Although most of the literature points out that shift work is associated with higher levels of burnout (Cunha, 2023), however a study conducted with nurses corroborated the results obtained, showing that nurses with fixed schedules had higher average burnout scores (Shamali *et al*, 2015).

In terms of experience, no correlation was found with the dimensions of CBI, among radiographers. However, studies on burnout in doctors, using the CBI and MBI, indicated that the greater the professional experience, the lower the levels of burnout, explaining these results with greater professional maturity that generates control over stressful situations (Lapa *et al*, 2018; Nobre *et al*, 2019; Li *et al*, 2024).

However, a study conducted on nurses found no significant relationship between experience and burnout (Fernandes, 2021). Although professional experience is a variable commonly associated with burnout, it is considered that the results obtained may be related to rapid technological development in these areas, which may be a significant stress factor, even for experienced professionals.

Finally, regarding the work type (Rad, NMR, TR) and its relationship with the dimensions of CBI, it was found that Radiographers have higher levels of Burnout, with particular emphasis on Burnout related to the patient, when compared with the others groups. Recent survey data from a 2025 study across work type (Rad, NMR, TR) found that mean burnout scores did not statistically differ across these areas, as measured by the Oldenburg Burnout Inventory (OLBI). Although radiographers had numerically higher mean burnout scores (Hanstein *et al.*, 2025). However, higher levels of burnout would be expected in radiotherapy and nuclear medicine, considering the high level of emotional suffering of the patients they have to deal with on a daily basis. A possible explanation for the opposite result may be the fact that therapeutic and nuclear medicine radiographers are more involved in postgraduate training in the area of communication and stress management, allowing them to develop strategies to minimise the stress they experience. From a systemic and organisational perspective, these findings can be attributed to the distinct workflow of diagnostic radiology. Unlike TR or NMR, which often involve scheduled, long-term interactions with patients, general radiography (Rad) is characterised by a high-volume, ‘fast-paced’ environment and unpredictable patient turnover, often in emergency settings. These job-related characteristics may contribute to higher levels of burnout.

Concerning the limitations of this study, it is important to mention the small sample size, due to low response rates to the questionnaire and the fact that there were significantly more responses from radiographers than from other areas.

This study contributes to the understanding of the development of the different dimensions of burnout in Rad, NMR, and TR. As the results relate to professionals in the central region of the country, generalisations should be made with caution. The scarcity of studies on burnout among these professionals highlights the importance of further research in these professional groups, particularly in the development of studies focused on burnout prevention.

5. CONCLUSIONS

The aim of this study was to analyse the levels of burnout (personal, work-related and patient-related) among radiographers in central Portugal and to relate this to the sociodemographic and occupational variables assessed (gender, experience, shift type, and work type).

The results show that there is no statistically significant difference between men and women, but there is a tendency for women to have higher levels of personal burnout and work-related burnout, while men showed higher levels of patient-related burnout. Regarding the shift type, it was found that radiographers with fixed shift have higher levels of patient-related burnout when compared to other types of work shift (mixed and rotating shifts). This highlights the impact of rigid shifts on the mental health of these professionals.

With regard to experience, the results did not reveal a significant correlation between experience and the development of burnout. This indicates that professional experience, in our sample, is not a factor associated to burnout.

As for the work type (Rad, NMR, TR), the results obtained revealed the influence of patient-related burnout. Radiology is the area in which professionals presented the highest burnout scores, which may indicate the need for more postgraduate training in stress management and communication skills.

Given the small sample size, these results should be interpreted with caution and cannot be generalised to the Portuguese population. However, the results contribute to the study of burnout among Radiographers and point to the need for further studies in order to clarify the relationships between work variables and burnout.

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