

BURNOUT AND HEALTH IN RADIOLOGISTS, NUCLEAR MEDICINE OR RADIOTHERAPY PROFESSIONALS

João Paulo Figueiredo^{1,2,C}, Mariana Oliveira³ and Ana Paula Amaral^{3,4}

¹Polytechnic University of Coimbra, Coimbra Health School, Scientific and Pedagogical Unit for Medical, Social and Human Sciences, Rua 5 de Outubro, 3045-043, Coimbra, Portugal; jpfigueiredo@estesc.ipc.pt; ORCID 0000-0002-9829-1592

²Health and Technology Research Center (H&TRC) Coimbra Health School, Scientific and Pedagogical Unit for Medical, Social and Human Sciences, Rua 5 de Outubro, 3045-043, Coimbra, Portugal

³Polytechnic University of Coimbra, Coimbra Health School, Scientific and Pedagogical Unit for Medical, Social and Human Sciences, Rua 5 de Outubro, 3045-043, Coimbra, Portugal

⁴Centre for Research & Innovation in Education (inED), Polytechnic University of Coimbra; Rua Dom João III – Solum, 3030 – 329 Coimbra, Portugal; anaamaral@estesc.ipc.pt; ORCID: 0000-0003-0760-4416

^CCorresponding author, jpfigueiredo@estesc.ipc.pt; ORCID 0000-0002-9829-1592

ABSTRACT

Background: In everyday life, both personally and professionally, human beings face various adversities. In healthcare professionals, sometimes more than in other professionals, occupational stress factors are varied and, in many cases, have a major impact on their health, triggering burnout syndrome. **Objectives:** To study burnout levels among radiologists, radiotherapy and nuclear medicine specialists, and the factors that predict burnout. **Methodology:** The study presented was observational, analytical and cross-sectional. The sample consisted of 70 professionals from the fields of Radiology, Radiotherapy and Nuclear Medicine. Burnout levels were assessed using the CBI-PT. **Results:** A large proportion of professionals presented high levels of burnout, particularly in the “Personal Burnout” dimension. Radiotherapy professionals are the most affected. There are significant differences in burnout levels in terms of gender and shift work. There are significant relationships between sleep quality, hours of sleep per day, and burnout. The results also show that the variables gender, sleep quality, hours of sleep per day, and professional area have an influence on the onset of burnout. **Conclusions:** It is important to raise awareness of this issue and to take measures to both prevent and treat healthcare professionals with burnout syndrome.

Keywords: Personal Burnout, Work-Related Burnout, User-Related Burnout, Sleep Quality.

1. INTRODUCTION

Burnout syndrome is now considered a disease by the World Health Organisation (WHO), included in the International Classification of Diseases (ICD-11) which came into effect on 1 January 2022 and is listed under code QD85. It is characterised by mental and physical exhaustion resulting from situations of extreme stress in professional life, leading to burnout.

This syndrome has been widely studied in recent decades, having been first described in 1974 by Herbert Freudenberg. The term burnout refers to a state of exhaustion and physical, emotional and mental fatigue resulting from long-term involvement in emotionally demanding work situations. It is a progressive state, where at a certain point, there is a loss of commitment to work, feelings of exhaustion, lack of effectiveness at work and decreased professional performance, with no longer any pleasurable or favourable feelings in daily work practice. It is thus characterised as chronic stress at work, which has not been managed effectively by the individual (Kristensen *et al*, 2005; Areosa & Queirós, 2020).

According to Maslach and Jackson, this syndrome is based on three distinct dimensions: depersonalisation, emotional exhaustion, and reduced sense of personal accomplishment (Vicente

et al, 2013; Perniciotti *et al*, 2020). ‘Depersonalisation’ corresponds to a lack of sensitivity towards the people to whom the service is provided and is characterised by increased coldness and contempt. ‘Emotional exhaustion’ manifests itself physically and mentally and stems from daily and repeated contact with other people's problems. Finally, people develop a feeling of low ‘personal fulfilment’ due to dissatisfaction with their activities, leading to a desire to leave their profession. Maslach and Jackson believe that occupational burnout occurs in a linear fashion and therefore, the individual initially feels emotionally exhausted, later begins to depersonalise, losing their sensitivity towards others, and these two dimensions combined give rise to feelings of low personal fulfilment (Ferrari *et al*, 2012; Singh *et al*, 2017).

Kristensen *et al*. (2005) state that fatigue and exhaustion are the main factors associated with various areas of each subject's life, such as work and how work relates to clients/users. Thus, they divided Burnout into three dimensions: Personal Burnout, Work-related Burnout, and Client-related Burnout. They define Personal Burnout as the physical and psychological fatigue experienced by the individual. Work-related Burnout is characterised as the personal attribution of symptoms experienced in relation to one's daily work. The dimension of Client-related Burnout is defined by the personal awareness that one's fatigue and exhaustion derive directly from the people with whom one interacts, in this case, users/patients (Kristensen *et al*, 2020).

With regard to some of the feelings and symptoms experienced in this condition, most subjects show irritability, lack of energy, low or no motivation, a deep sense of failure and even intolerance to work. They may often experience headaches, nausea, coughing, chest pain, prolonged fatigue, and changes in normal sleep patterns, which leads to poor sleep quality and tiredness (Gamero *et al*, 2021).

Healthcare professionals are the most affected when it comes to burnout syndrome, partly due to long working hours. Radiology technicians are the ones who most often report feeling a lack of autonomy and undervaluation of their work by their peers when compared to radiologists, for example, which leads to feelings of dissatisfaction and demotivation. Often, one of the factors that causes this health condition is also the lack of consistency between low monthly salaries and the work performed, which is often excessive. (Kovaleski & Bressan, 2012; Singh *et al*, 2017). Radiotherapists are particularly prone to this syndrome, as they work in an emotionally intense and extremely stressful environment, given that they work with high technology, administering high doses of radiation to patients who are often in a fragile condition (Martins 2017; Guerra & Patrício, 2018; Areosa & Queirós, 2020).

Given this fact, the objective of this study was to assess the levels of burnout in radiologists, radiotherapy and nuclear medicine specialists and the respective predictors associated with this phenomenon.

2. MATERIALS AND METHODS

The study was observational, analytical and cross-sectional. The sample consisted of 70 professionals from the fields of Radiology, Radiotherapy and Nuclear Medicine in Portugal, of whom 61 were female and 9 were male, aged between 22 and 52.

Data collection began after approval by the Ethics Committee of the Polytechnic Institute of Coimbra (OPINION No. 141_CEIPC/2022).

The data collection instrument used was the CBI-PT questionnaire, Copenhagen Burnout Inventory Questionnaire, authorised for use by the author of the Portuguese version. This questionnaire is a burnout measurement tool developed by Kristensen *et al*. and consists of 19 questions. It was translated and validated into Portuguese (Fonte 2011).

It is a self-assessment scale consisting of three dimensions: personal burnout with six questions, which assesses exhaustion at both the physical and psychological levels; work-related burnout with seven questions, which assesses the degree of fatigue related to work; and client-related burnout with six questions, which assesses fatigue related to the target audience to which the work is directed. The name of this last dimension can be changed according to the target audience. Thus, since we are talking about health, this last dimension should be entitled User/Patient-Related Burnout.

It is a 5-point Likert-type self-assessment scale: 'Always' or 'Very much' (100 points), 'Frequently' or 'Quite a lot' (75 points), 'Sometimes' or 'So-so' (50 points), 'Rarely' or 'A little' (25 points) and 'Never/almost never' or 'Very little' (0 points). In one of the questions, the scores are reversed, being 'Never/almost never' (100 points), 'Rarely' (75 points), 'Sometimes' (50 points), 'Frequently' (25 points) and 'Always' (0 points).

The total score on the scale corresponds to the average of the item scores, and values equal to or greater than 50 points are considered a high level of burnout. The internal consistency of the respective subscales was assessed, and we obtained the following Cronbach's alpha coefficient results: 0.845, 0.866, and 0.843 for personal burnout, work-related burnout, and customer-related burnout, respectively. These values allow us to conclude that the instrument has good internal consistency.

The collected data were processed using IBM SPSS statistical software version 27. The statistical tests used were Mann-Whitney U, Student's t-test, Pearson's linear correlation coefficient, and multiple linear regression model. As a rule, a sample size of $N = 5k$ was assumed for the application of Multiple Linear Regression (MLR) with a given number of independent variables (k) (Hill & Hill, 2002).

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

The following table brings together a set of information that allows the sample to be characterised.

Table 1: General characteristics of the sample

		n	%
Gender	Female	61	87
	Male	9	13
Marital status	Single	59	84
	Married / Civil partnership	9	13
	Divorced	2	3
Who you live with	Alone	16	23
	With parents	17	24
	With siblings	1	1

		n	%
	With partner	29	41
	With children	2	3
	With housemates	4	6
	With grandparents	1	1
Hours of sleep/night	[5 a 7[hours	25	36
	[7 a 8[hours	42	60
	≥8h hours	3	4
Sleep quality	Poor	5	7
	Fair	29	41
	Good	33	47
	Very good	3	4
Region where you work	Coimbra, Porto and Lisboa	32	46
	Other locations	38	54
Workspace	Radiology	54	77
	Radiotherapy	12	17
	Nuclear Medicine	4	6
Hours worked per week	≤ 40 hours	52	74
	> 40 hours	18	26
Shift work	Yes	55	79
	No	15	21
I work in more than one location	Yes	15	21
	No	55	79
Years of professional experience	< 5 years	52	74
	[5 a 10[years	9	13
	[10 a 20[years	7	10
	[20 a 30] years	2	3
Age (M±SD)		28.4 ±6.81	

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

The sample consisted of 70 healthcare professionals, 54 from the field of radiology, 12 from the field of radiotherapy and 4 from the field of nuclear medicine, 87% of whom were female and with an average age of approximately 28. In terms of marital status, 84% were single. Regarding “who they live with”, 41% of respondents said they lived with a partner. 60% reported sleeping between 7 and 8 hours per night, with 47% saying their sleep quality was good. As for their place of work, 21% of respondents work in Lisbon, 16% in Faro, 13% in Coimbra and 11% in Porto. Regarding weekly working hours, 74% work 40 hours or less and most professionals had less than 5 years of professional experience.

3.2 INFERENTIAL ANALYSIS

About burnout indicators, it was found that more than half of the professionals (54%) had levels of personal burnout, 39% had levels of work-related burnout, and 21% had levels of client/user-related burnout.

Table 2: Assessment of burnout levels according to gender

		M	SD	p
Personal Burnout	Female	52.59	15.70	0.005
	Male	36.11	16.40	
	Lisboa, Coimbra and Porto	49.09	16.62	0.525
	Other locations	51.64	16.77	
	Shift work (Yes)	51.36	16.74	0.397
	Shift work (No)	47.22	16.34	
	≤ 40 hours*	48.79	15.56	0.153
	> 40 hours	55.32	19.00	
Work-related burnout	Female	47.07	15.34	0.247
	Male	40.48	19.07	
	Lisboa, Coimbra and Porto	45.65	16.14	0.782
	Other locations	46.71	15.83	
	Shift work (Yes)	48.18	14.85	0.047
	Shift work (No)	39.05	17.88	
	≤ 40 hours*	44.85	16.23	0.220
	> 40 hours	50.19	14.47	
User-related burnout	Female	37.09	16.19	0.814
	Male	35.65	22.83	
	Lisboa, Coimbra and Porto	36.59	18.20	0.888
	Other locations	37.17	16.13	
	Shift work (Yes)	38.41	17.14	0.157
	Shift work (No)	31.39	15.34	
	≤ 40 hours*	36.21	17.80	0.533
	> 40 hours	38.89	14.64	

Legend: M (Mean) ± SD (Standard deviation). * - Hours worked per week.

According to the results shown in table 2, we can see that there is a significant difference in 'Personal Burnout' between men and women ($p < 0.05$) and that the highest values are found in female individuals compared to the male group.

About the *region where they work*, Coimbra, Porto, and Lisbon were grouped together as the three main cities, and then the other locations were added to statistically assess the influence of the region on burnout. However, no significant differences were found ($p > 0.05$), so we can conclude that the region where they work has no impact on burnout rates (table 2). As for *shift work*, it was found that statistically significant differences ($p < 0.05$) were only recorded in the dimension 'Work-related Burnout'. Professionals who worked shifts had higher levels of 'Work-related Burnout'.

According to *weekly working hours*, it was found that professionals who work more than 40 hours per week had more burnout than professionals who work 40 hours or less. However, this difference was not statistically significant ($p > 0.05$).

In terms of *professional area*, statistically significant differences ($p = 0.018$) were only found in the dimension 'Work-related Burnout' between the areas of Radiology and Nuclear Medicine. Nuclear Medicine professionals had lower values of 'Work-related Burnout' compared to Radiology professionals.

We also sought to assess whether years of professional experience were related to different levels of burnout. No significant differences were found between the classes of years of professional experience among the different types of burnout analysed (Personal: $F = 0.882$; $p = 0.455$; Work: $F = 0.592$; $p = 0.623$; Client: $F = 0.729$; $p = 0.538$).

As for the *age of professionals*, no significant correlation was observed between this biographical indicator and the different types of burnout (Personal: $r = 0.071$; $p = 0.560$; Work: $r = 0.120$; $p = 0.324$; Client: $r = 0.005$; $p = 0.966$).

Finally, we also sought to assess whether professionals who reported working in more than one location would express higher levels of burnout. We also found no significant differences between the groups (Staff: $p = 0.858$; Work: $p = 0.518$; Client: $p = 0.181$).

With regard to sleep quality and sleep quantity (number of hours of sleep per night) and three dimensions of burnout, let us look at Table 3.

Table 3: Correlation between the three dimensions of burnout and sleep quality and hours of sleep per night

N = 70	1	2	3	Sleep Quality	Hours of Sleep per Night
1. Personal Burnout	<i>r</i>	0.810	0.611	-0.479	-0.351
	<i>p</i>	<0.001	<0.001	<0.001	0.003
2. Work-Related Burnout	<i>r</i>		0.725	-0.455	-0.373
	<i>p</i>		<0.001	<0.001	0.001
3. Customer-Related Burnout	<i>r</i>			-0.297	-0.329
	<i>p</i>			0.013	0.005

About *sleep quality* and *sleep quantity* (number of hours of sleep per night), the results suggested significant correlations between these variables and the three dimensions of burnout (Table 3).

That is, the poorer the sleep quality and the lower the amount of sleep, the more burnout the participants experienced in the three dimensions. We also found that there were significant correlations between the three dimensions of burnout.

Finally, we sought to determine the predictors of burnout in the study population. Let us look at table 4:

Table 4: Predictors of burnout in healthcare professionals

N = 70		B	t	p	$F_{(df1;df2);p}$	R^2_{Adj}
1. Personal Burnout	Gender	0.295	2.985	0.004	9.252(5;64); <0.001	0.374
	Hours of Sleep per Night	-0.250	-2.445	0.017		
	Sleep Quality	-0.306	-2.910	0.005		
	Area – Nuclear Medicine	-0.272	-2.803	0.007		
	Area - Radiotherapy	-0.138	-1.430	0.158		
2. Work-Related Burnout	Gender	0.095	0.906	0.369	6.586(5;64); <0.001	0.288
	Hours of Sleep per night	-0.226	-2.074	0.042		
	Sleep Quality	-0.331	-2.948	0.004		
	Area – Nuclear Medicine	-0.294	-2.841	0.006		
	Area - Radiotherapy	-0.095	-0.926	0.358		
3. Customer-Related Burnout	Gender	0.109	1.031	0.306	5.741(6;63); <0.001	0.292
	Hours of Sleep per Night	-0.212	-1.946	0.056		
	Sleep Quality	-0.333	-2.973	0.004		
	Works in more than one place	-0.120	-1.158	0.251		
	Area – Nuclear Medicine	-0.312	-2.990	0.004		
	Area - Radiotherapy	-0.104	-1.010	0.317		

Legend: Gender: Female = 1; Male = 0; Hours of Sleep per night: = 1; Hours of Sleep per Night: 0 = Adequate hours of sleep; 1 = Inadequate hours of sleep; Area – Radiology = 0; Area - Nuclear Medicine = 1; Area - Radiotherapy = 1; Works in more than one place: 1 – Yes; 0 = No.

According to the results presented in terms of ‘Personal Burnout,’ we found that female professionals revealed significantly higher levels of this indicator compared to the male group. On the other hand, professionals with fewer hours of sleep ($\leq 6.0h$), poorer quality of this indicator (sleep), and those working in the field of Radiology presented higher levels of ‘Personal Burnout.’

As for the Work-Related Burnout index, according to the results estimated in Table 4, professionals who self-reported fewer hours of sleep ($\leq 6.0h$), poorer sleep quality and who work in the field of Radiology showed higher levels of this type of Burnout. However, no significant

effects were recorded in the variation of this type of burnout between groups (male and female) and between professionals working in Radiology or Radiotherapy. A similar profile was also observed in terms of Customer-Related Burnout.

4. DISCUSSION

The results obtained reveal that there is a high percentage of technicians with high levels of burnout, mainly in the 'Personal Burnout' dimension. Radiotherapy professionals are the most affected by this condition, followed by radiology professionals. No significant burnout results were obtained for nuclear medicine technicians.

As mentioned above, according to Burnout indicators, more than half of professionals (54%) show levels of Personal Burnout, 39% show levels of Work-related Burnout and 21% show levels of Customer/User-related Burnout. Cesaltino Fonte, in 2011, states in the studies analysed that the dimension 'customer-related burnout' is the one with the lowest levels of burnout. This is also true in the study presented (Fonte, 2011).

When comparing men and women, the results suggest that women are the most affected, with the exception of the dimension 'Customer-related burnout'. Cesaltino Fonte notes that, in most studies, women have higher levels of burnout when compared to men (Fonte, 2011).

In a study conducted during the coronavirus (Covid-19) pandemic, although most professionals were nurses, it was found that those most affected by burnout were younger people with less time in the profession. This is not the case in the present study, as there are no significant differences in terms of the age of participants and burnout (Moser *et al*, 2021).

The predictor variables for burnout are gender, sleep quality, hours of sleep per day, and professional field. The variable sleep quality stands out, as it is a predictor of the three dimensions of burnout, making it the most important variable to consider. According to the literature, sleep quality has a marked influence on the onset of burnout syndrome (Simões & Bianchi, 2017; Sabinne *et al*. 2022; Maluleka *et al*, 2026).

As mentioned in this study and in the literature, poor sleep quality is a risk factor for burnout. Healthcare professionals are often required to work long shifts, which reduces their productivity and significantly increases stress. Poor sleep quality and reduced hours of sleep influence the onset of this health condition - burnout, since sleep quality and stress are closely linked. The literature states that sleep and stress are closely related; the poorer the sleep quality, the higher the stress levels. High levels of stress and sleep disturbances are associated with metabolic changes and are linked to the onset of various diseases, such as diabetes, obesity and burnout (Hirotsu *et al*, 2015; Arezes *et al*, 2020; Stoian-Bălăşoiu *et al*., 2025).

5. CONCLUSIONS

The sample showed high levels of burnout. In the 'personal burnout' dimension, radiotherapy professionals had the highest levels. In turn, those in the radiology area had the highest levels of burnout in the 'work-related burnout' and 'customer-related burnout' dimensions.

There is a relationship between burnout and shift work, which tells us that rotating shifts increase burnout. There is also a higher prevalence among women, and we found that sleep quality and hours of sleep per night influence the presence of burnout among professionals in the fields of radiology, radiotherapy, and nuclear medicine.

The highest burnout scores occur in the dimensions “Personal Burnout” and “Work-related Burnout”, while in the dimension “Client-related Burnout” the scores are not as high. This leads us to believe that professionals are exhausted, but not in relation to users.

With regard to the limitations of the study, we highlight the low response rate of professionals to the questionnaire, which prevented us from obtaining a nationally representative sample.

However, the results allow us to conclude that individuals at greatest risk of burnout are female, work in radiology, sleep less than 7 hours per night and consider their sleep to be of poor quality. In the future, it is hoped that this study will contribute to raising awareness among radiology, nuclear medicine and radiotherapy professionals, increasing awareness of this issue and the importance of developing preventive measures and treatment for these professionals with burnout.

REFERENCES

- Areosa, J., & Queirós, C. (2020). Burnout: uma patologia social reconfigurada na era COVID-19? *International Journal on Working Conditions*, (20), 71–90.
- Arezes, P., Baptista, J. S., Barroso, M. P., Carneiro, P., Cordeiro, P., Costa, N., Melo, R., Miguel, A. S., & Perestrelo, G. (2020). *International Symposium on Occupational Safety and Hygiene: Proceedings Book of the SHO2020*. (Editora/Organização).
- Ferrari, R., França, F. M., & Magalhães, J. (2012). Avaliação da síndrome de burnout em profissionais de saúde: uma revisão integrativa da literatura. *Revista Eletrônica Gestão & Saúde*, 3(3), 1150–1165.
- Fonte, C. M. S. (2011). *Adaptação e validação para português do questionário de Copenhagen Burnout Inventory (CBI)* [Dissertação de mestrado, Universidade de Coimbra]. Repositório Institucional. <http://hdl.handle.net/10316/18118>
- Guerra, J., & Patrício, M. (2018). Burnout in radiation therapists: Systematic review with meta-analysis. *European Journal of Cancer Care*, 28(3), e12932. <https://doi.org/10.1111/ecc.12932>
- Hill, M. M., & Hill, A. (2002). *Investigação por questionário* (2.^a ed. rev. e corr.). Edições Sílabo.
- Hirotsu, C., Tufik, S., & Andersen, M. L. (2015). Interactions between sleep, stress, and metabolism: From physiological to pathological conditions. *Sleep Science*, 8(3), 143–152. <https://doi.org/10.1016/j.slsci.2015.09.002>
- Kovaleski, D. F., & Bressan, A. (2012). Metasínteses qualitativas e revisões integrativas: A síndrome de burnout em profissionais de saúde. *Revista Brasileira de Medicina do Trabalho*, (2), 107–113.
- Kristensen, T. S., Borritz, M., Villadsen, E., & Christensen, K. B. (2005). The Copenhagen Burnout Inventory: A new tool for the assessment of burnout. *Work & Stress*, 19(3), 192–207. <https://doi.org/10.1080/02678370500297720>
- Maluleka, M. M., Buló, F. N., Nair, A., & von Pressentin, K. B. (2026). Burnout in healthcare professionals. *South African Family Practice*, 68(1). <https://doi.org/10.4102/SAFP.v68i1.6235>
- Martins, C. R. (2017). *Síndrome de burnout nos profissionais de saúde: Causas, consequências, prevenção e tratamento* [Dissertação de mestrado, Universidade da Beira Interior]. Repositório Institucional.
- Medina Gamero, A. R., Regalado Chamorro, M. E., Porras Molina, J. M., & Rosario Pacahuala, E. A. (2021). Burnout in health professionals: Is it an existing problem? *Atención Primaria*, 53(7), 102079. <https://doi.org/10.1016/j.aprim.2021.102079>
- Moser, C. M., Monteiro, G. C., Narvaez, J. C. M., Ornell, F., Calegaro, V. C., Bassols, A. M. S., & et al. (2021). Saúde mental dos profissionais da saúde na pandemia do coronavírus (Covid-19). *Revista Brasileira de Psicoterapia*, 23(1), 107–125.
- Perniciotti, P., Júnior, C. V. S., Guarita, R. V., Morales, R. J., & Romano, B. W. (2020). Síndrome de Burnout nos profissionais de saúde: atualização sobre definições, fatores de risco e estratégias de prevenção. *Revista da Sociedade Brasileira de Psicologia Hospitalar*, 23(1), 35–52.
- Simões, J., & Bianchi, L. R. (2017). Prevalência da síndrome de burnout e qualidade do sono em trabalhadores técnicos de enfermagem. *Saúde e Pesquisa*, 9(3), 473–481.

- Singh, N., Knight, K., Wright, C., Baird, M., Akroyd, D., Adams, R. D., & *et al.* (2017). Occupational burnout among radiographers, sonographers and radiologists in Australia and New Zealand: Findings from a national survey. *Journal of Medical Imaging and Radiation Oncology*, 61(3), 304–310. <https://doi.org/10.1111/1754-9485.12547>
- Stoian-Bălăsoiu, I. R., Diaconescu, L. V., Mihăilescu, A. I., Stan, S., Ciobanu, A. M., & Popa-Velea, O. (2025). Contributing Factors to Burnout in Healthcare Professionals—Does Emotional Intelligence Play a Protective Role? A Narrative Review. *Healthcare (Basel)*, 13(17), 2156. <https://doi.org/10.3390/healthcare13172156>
- Taranu, S., Ilie, A., Turcu, A.-M., Stefaniu, R., Sandu, I., Pislaru, A., Alexa, I., Sandu, C., Rotaru, T.-S., & Alexa-Stratulat, T. (2022). Factors Associated with Burnout in Healthcare Professionals. *International Journal of Environmental Research and Public Health*, 19(22), 14701. <https://doi.org/10.3390/ijerph192214701>
- Vicente, C. S., Oliveira, R. A., & Marôco, J. (2013). Análise fatorial do inventário de burnout de Maslach (MBI-HSS) em profissionais portugueses. *Psicologia, Saúde & Doenças*, 14(1), 152–167. http://repositorio.ispa.pt/bitstream/10400.12/2494/1/PSD_14_152-167.pdf