

Research Article

# Burnout in Surgeons from a Tertiary Public University Hospital

Maria Luiza Costa<sup>\*</sup> , Walter Villela de Andrade Vicente 

Department of Surgery and Anatomy, Ribeirão Preto Medical School, University of São Paulo, São Paulo, Brazil

## Abstract

Surgeon burnout has been attracting worldwide attention. This study aimed to determine the prevalence rate for both Burnout Syndrome (BS) and burnout evidence and to identify burnout risk factors in surgeons from a high-complexity academic center, in Brazil. A dichotomized socio-demographic questionnaire and the MBI-HSS questionnaire were employed. Data collection was conducted on a personal computer REDCap program. The MBI-HSS Latent profile analysis (LPA) was used. BS rate corresponded to the LPA Burnout class rate. The burnout evidence prevalence rate was equivalent to the sum of all LPA classes, except for the Engagement one. The univariate Fisher's exact test was used for intra and inter class burnout risk factor investigation. A  $p$  value  $\leq 0.05$  was considered significant. Among the 77 surgeons analyzed, the BS prevalence rate was 6%. The burnout evidence prevalence rate was 31.1%. Almost half (41.6%) of the respondents could not be classed in any of 5 LPA profiles. There were no significant differences between the surgeons presenting with burnout evidence and the engaged ones. No burnout risk factor could be detected, but less surgical workload (days/wk.) and full-time job regime both accentuated burnout levels in the personal accomplishment LPA dimension.

## Keywords

Burnout Syndrome, Surgeon Burnout, Occupational Stress, Latent Burnout Profiles

## 1. Introduction

Surgeons must usually endure a long-lasting training program to acquire professional expertise. They take direct responsibility for the surgical results and patient recovery; and must cope with the frustration arising from their patient's complications and death. Moreover, physical, and exhaustion and suffering resulting from the execution of difficult, complex, and time-consuming operations are frequent issues. The surgical staff of high-complexity hospitals constantly deals with more demanding cases and stressful situations and is prone to develop burnout [1-4], but this hypothesis has been insufficiently addressed in the literature. Based

on the above, this investigation was set out to investigate the prevalence of the Burnout Syndrome (BS) and burnout evidence, as well as socio-demographic and professional burnout risk factors in surgeons from different specialties of a high-complexity university public tertiary hospital.

## 2. Material & Methods

The study was performed at the Department of Surgery and Anatomy of the Ribeirão Preto Medical School Hos-

<sup>\*</sup>Corresponding author: [tecnologiahumana@hotmail.com](mailto:tecnologiahumana@hotmail.com) (Maria Luiza Costa)

Received: 29 February 2024; Accepted: 2 April 2024; Published: 10 May 2024



Copyright: © The Author(s), 2024. Published by Science Publishing Group. This is an **Open Access** article, distributed under the terms of the Creative Commons Attribution 4.0 License (<http://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution and reproduction in any medium, provided the original work is properly cited.

pital of the University of São Paulo, a high complexity tertiary level public center that provides free-of-charge medical care financed by the Brazil Unified Health System, whereas a limited clientele coexists at the hospital private clinic. The evaluation took place from June through November 2017. A staff list was obtained from the Department's secretary. It included 32 different rank professors and 85 assisting physicians. The inclusion criteria were: 1. Surgeons of both sexes. 2. Contractual link with the University or else, with the hospital. 3. Regular surgical activities in any of the specialized surgical divisions of the Department. 4. Signature of the free and informed consent form. The exclusion criteria were: 1. non-agreement to take part in the survey. 2. Failure, for any reason, including holidays and vacations, to complete the questionnaires during the data collection period. The investigational instruments were two closed-questions questionnaires. A general questionnaire (GQ) explored dichotomized socio-biographic and professional variables, the latter concerning only the activities in the institution. The GQ explored the following variables: 1. Age, 2. Sex, 3. Marital status, 4. Offspring, 5. Number of years as house staff, 6. Functional status, 7. Number of operation days/wk., 8. Number of major operations performed/wk., 9. Contractual working regime, and 10. On-site calls. The other questionnaire was a Portuguese version of the MBI-HSS [5] aimed at characterizing and detecting burn-

out, adapted, and validated to Brazil with grammar improvements to warrant the intentionality of the tool items and avoid dubious interpretation by the respondents. The MBI-HSS tool construct was validated by factorial analysis and the sample adequacy was determined by the Kaiser-Meyer-Olkin method (Table 1). The reliability of the questionnaire and the internal consistency of the three MBI-HSS dimensions, *i.e.*, emotional exhaustion (EE), depersonalization (DP), and personal accomplishment (PA) were evaluated by the Cronbach's  $\alpha$  coefficient (Table 2). The latent profile analysis (LPA) allocated the respondents to 5 classes, as previously published: 1. Burnout: high burnout level in the EE and DP dimensions, and low in the PA dimension; 2. Engaged: low burnout level in EE and DP dimensions, and high in PA; 3. Overloaded: high burnout level only in EE dimension, 4. Disengaged: high burnout level only in the DP dimension; and 5. Ineffective: low burnout level only in the PA dimension [6]. The BS prevalence rate was defined as the LPA Burnout class prevalence rate. The prevalence rate for burnout evidence was obtained by subtracting the Engaged class prevalence rate from the sum of the four remaining LPA class prevalence rates. Burnout risk factors were investigated by comparing a burnout group comprised of LPA Burnout, Overloaded, Disengaged, and Ineffective class-profiled surgeons with a no-burnout group represented by the LPA Engaged respondents.

**Table 1.** The MBI-HSS scale\* Kaiser-Meyer-Olkin index analysis for the responded questionnaires (n = 77).

MBI-HSS question	Factors			Communality
	EE	DP	PA	
1	0,79	-0,12	0,11	0,65
2	0,89	-0,08	0,03	0,80
3	0,81	-0,18	0,20	0,73
6	0,82	-0,26	0,09	0,75
8	0,90	-0,19	0,12	0,87
13	0,69	-0,30	0,24	0,62
14	0,76	0,08	0,05	0,59
16	0,72	-0,15	-0,19	0,58
20	0,77	-0,12	0,25	0,66
5	-0,01	-0,27	0,84	0,78
10	0,19	-0,07	0,81	0,69
11	0,37	-0,06	0,75	0,71
15	-0,04	-0,16	0,66	0,47
22	0,46	-0,12	0,39	0,38
4	0,12	0,51	-0,04	0,27

MBI-HSS question	Factors			Communality
	EE	DP	PA	
7	-0,01	0,78	-0,06	0,61
9	-0,10	0,71	-0,19	0,55
12	-0,33	0,70	0,07	0,61
17	-0,23	0,71	-0,02	0,56
18	-0,25	0,64	-0,19	0,50
19	-0,14	0,69	-0,35	0,62
21	-0,33	0,75	-0,25	0,73
Auto value	8,4058	3,2016	2,1195	
Factor explained variance by	64962	4,2115	3,0191	
Contribution to the total variance	0,3821	0,1455	0,0963	
KMO index				0,8285

\*Maslach Burnout Inventory-Human Services Survey, Maslach Burnout Inventory manual. Maslach, Jackson, Leiter. 1996, 3<sup>rd</sup>Ed., CPP, Monte View, California, EUA

**Table 2.** The Cronbach's alpha coefficients for the 22 items, as well as for the three MBI-HSS questionnaire\* dimensions: emotional exhaustion (EE), depersonalization (DP), and personal accomplishment (PA).

Item	Correlation to the total	Cronbach's $\alpha$	Cronbach's $\alpha$
Whole scale			0,749
1	0,59	0,72	
2	0,67	0,71	
3	0,62	0,71	
6	0,58	0,72	
8	0,69	0,71	
13	0,50	0,72	
14	0,59	0,72	
16	0,46	0,73	
20	0,62	0,72	
5	0,11	0,75	
10	0,30	0,74	
11	0,47	0,73	
15	0,10	0,75	
22	0,40	0,74	
4	0,13	0,75	
7	0,11	0,75	
9	0,01	0,76	
12	-0,10	0,77	

Item	Correlation to the total	Cronbach's $\alpha$	Cronbach's $\alpha$
17	-0,05	0,76	
18	-0,14	0,77	
19	-0,06	0,76	
21	-0,19	0,78	
EE Dimension			0,938
1	0,76	0,93	
2	0,85	0,93	
3	0,81	0,93	
6	0,82	0,93	
8	0,91	0,92	
13	0,71	0,93	
14	0,66	0,94	
16	0,64	0,94	
20	0,74	0,93	
DP Dimension			0,797
5	0,69	0,73	
10	0,67	0,73	
11	0,70	0,72	
15	0,47	0,79	
22	0,40	0,81	
PA Dimension			0,860
4	0,33	0,88	
7	0,63	0,84	
9	0,62	0,85	
12	0,65	0,84	
17	0,64	0,84	
18	0,59	0,85	
19	0,69	0,83	
21	0,78	0,82	

\*Maslach Burnout Inventory-Human Services Survey, Maslach Burnout Inventory manual. Maslach, Jackson, Leiter. 1996, 3<sup>rd</sup> Ed., CPP, Mountain View, California, EUA

One of the investigators (MLC) contacted the participants personally, at their regular hospital working hours, to obtain the consent form signature. The surgeons responded to the questionnaires on a dedicated personal computer at a convenient time, in a hospital room used during the surgeons' clinical activities, where he or she remained alone, without any kind of interruption. REDCap software (Research Electronic Data Capture software, Vanderbilt University, availa-

ble under license and free of charge at <https://redcap.fmrp.usp.br>.) was used for data collection and management. The Ethics Committee approved the Project and the consent form, according to the Helsinki Declaration (Process # 17627/2015, 2015/12/07). The responding questionnaires and the participant's identification remained confidential.

The Fisher's exact test (SAS - Statistical Software package,

version 9.3, SAS Institute, Inc., Cary, NC, USA) was used for intra and inter-group comparisons. A  $p$ -value  $\leq 0.05$  was considered statistically significant.

### 3. Results

Twenty professors were included, while 12 others were excluded for the following reasons: two were intensive therapy physicians and did not operate, four worked at the Division of Anatomy; one was on leave; two were on medical leave; one was abroad, and two were commissioned off-site. Fifty-seven assisting physicians were included. Among the 28 excluded, eight were endoscopists; one died; one was on medical leave; one had retired; one was on paternity leave; two resigned; eight were intensive care physicians, and six held only supporting clinical activities. Most surgeons ( $n=52$ , 68%) were aged  $>40$ , 70 (90%) were men, 71 (92%) were married or in stable unions, and 66 (86%) had children (Table 3). Forty-two re-

spondents (55%) were on the staff for  $\leq 15$ y, 39 (51%) had  $\leq 2$  operative days/wk., and 11 (14%) did  $>2$  major operations/wk. Fifty-six surgeons (73%) were hired part-time. Thirty-nine surgeons (51%) held on-site shifts. The burnout levels in the three MBI-HSS scale dimensions were predominantly low (Table 4). In the PA dimension, two GQ variables, *i.e.*,  $\leq 2$  operating days/wk. (Table 5,  $p = 0.001$ ), and full-time contractual regime (Table 6,  $p = 0.037$ ) were associated with higher burnout levels. Table 7 shows that the BS prevalence rate was 6%, the burnout evidence rate was 31%, while almost half of the surgeons ( $n = 32$ , 42%) could not be patterned in any of the 5 LPA profiles. Among them, 13 (17%) had high or low burnout levels in only two dimensions, while 19 (25%) had no high or low burnout levels in any of the three dimensions. Table 8 displays that no statistically significant differences were found between the burnout and no burnout group.

**Table 3.** Surgeon distribution ( $n$ , %) into the dichotomized socio-demographic and professional variables.

Variables	n	%
Age (years)		
$\leq 40$	25	32
$>40$	52	68
Sex		
Male	70	91
Female	7	9
Marital status		
Single/separated or divorced/widowed	6	8
Married or stable union	71	92
Children		
No	11	14
Yes	66	86
Years working at the institution		
$\leq 15$	42	55
$>15$	35	45
Functional status		
Hospital staff	57	74
University staff	20	26
Weekdays assigned to the OR		
$\leq 2$	39	51
$>2$	38	49
Number of major operations/wk.		

Variables	n	%
$\leq 2$	66	86
$> 2$	11	14
On-duty schedule (hours/wk.)		
$< 40$	56	73
40	21	27
On site calls		
No	38	49
Yes	39	51

**Table 4.** Surgeon ( $n=77$ ) burnout level distribution ( $n$ , %) in the emotional exhaustion (EE), depersonalization (DP), and personal accomplishment (PA) dimensions<sup>+</sup>.

Burnout levels	EE	DP	PA
High	19 (25%)	15 (19%)	26 (34%)
Medium	15 (19%)	8 (11%)	18 (23%)
Low	43 (56%)	54 (70%)	33 (43%)
Total	77 (100%)	77 (100%)	77 (100%)

<sup>+</sup>Maslach Burnout Inventory-Human Services Survey, Maslach Burnout Inventory manual. Maslach, Jackson, Leiter. 1996, 3<sup>rd</sup>Ed., CPP, Mountain View, California, EUA

**Table 5.** Surgeon MBI-HSS scale dimensions<sup>+</sup> and burnout level distribution ( $n$ , %) according to operating room duties (days/week). The statistically significant  $p$ -value is highlighted.

MBI-HSS scale dimensions	Burnout levels	Operating room duties (days/wk.)		p*
		$\leq 2$	$> 2$	
Emotional exhaustion (EE)	High	11(28%)	8(21%)	0,475
	Medium	9(23%)	6(16%)	
	Low	19(49%)	24(63%)	
Depersonalization (DP)	High	10(26%)	5(13%)	0,110
	Medium	6(15%)	2(5%)	
	Low	23(59%)	31(82%)	
Personal accomplishment (PA)	High	21(54%)	5(13%)	0,001
	Medium	7(18%)	11(29%)	
	Low	11(28%)	22(58%)	

<sup>+</sup>Maslach Burnout Inventory-Human Services Survey, Maslach Burnout Inventory manual. Maslach, Jackson, Leiter. 1996, 3<sup>rd</sup>Ed., CPP, Mountain View, California, EUA

\*Fisher's exact test

**Table 6.** Surgeon MBI-HSS scale dimension<sup>+</sup> and burnout level distribution (n, %) according to the contractual working regime (hours/week). The statistically significant p-value is highlighted.

MBI-HSS scale Dimensions	Burnout levels	Contractual working regime (hours/week)		p*
		≤ 40	40	
Emotional exhaustion (EE)	High	12 (21%)	7 (33%)	0,348
	Medium	10 (18%)	5 (24%)	
	Low	34 (61%)	9 (43%)	
Depersonalization (DP)	High	9 (16%)	6 (28%)	0,391
	Medium	7 (13%)	1 (4%)	
	Low	40 (71%)	14 (67%)	
Personal accomplishment (PA)	High	14 (25%)	12 (58%)	<b>0,037</b>
	Medium	15 (27%)	3 (14%)	
	Low	27 (48%)	6 (28%)	

<sup>+</sup>Maslach Burnout Inventory-Human Services Survey, Maslach Burnout Inventory manual. Maslach, Jackson, Leiter. 1996, 3<sup>rd</sup> Ed., CPP, Mountain View, California, EUA<sup>22</sup>

\* Fisher's exact test

**Table 7.** Surgeon distribution (n, %) according to the latent burnout profiles<sup>+</sup> with respective high (↑) or low (↓) dimension characteristics. Thirty-two surgeons (41.6%) did not fit in any of the five latent profiles.

Profiles	Dimension characteristics*	n, (%)
1. Burnout	↑EE ↑DP ↓PA	5 (6%)
2. Disengagement	↑DP	4 (5%)
3. Inefficient	↓PA	9 (12%)
4. Overcharged	↑EE	6 (8%)
5. Engagement	EE↓ e DP↓ e PA↑	21 (27%)
Unclassifiable scoring	↑EE ↑DP or ↑DP ↓ PA or ↑EE e ↓PA	13 (17%)
No scoring	-	19 (25%)

<sup>+</sup>Maslach Burnout Inventory-Human Services Survey, Maslach Burnout Inventory manual. Maslach, Jackson, Leiter. 1996, 3<sup>rd</sup> Ed., CPP, Mountain View, California, EUA

\*EE (Emotional Exhaustion), DP (Depersonalization), PA (Personal accomplishment)

**Table 8.** Surgeon distribution into burnout and no burnout groups. The burnout group included the Burnout, Disengaged, Ineffective, and Overloaded profiled surgeons<sup>+</sup>. The no burnout group was represented by the Engaged class surgeons<sup>+</sup>.

Variable	no Burnout (n)	Burnout (n)	p*
Age (years)			
≤ 40	6	8	0,758
> 40	15	16	
Sex			

Variable	no Burnout (n)	Burnout (n)	p*
Male	20	23	1
Female	1	1	
Marital status			
Single/separated or divorced/widowed	1	2	1
Married or in a stable union	20	22	
Children			
No	2	2	1
Yes	19	22	
Number of years working at the institution			
≤15	12	13	1
>15	9	11	
Functional status			
Hospital staff	16	17	0,746
University status	5	7	
Number of weekdays assigned to the OR			
≤2	7	14	0,136
>2	14	10	
Number of major operations/wk.			
≤2	18	22	0,652
>2	3	2	
On-duty schedule (hours/wk.)			
<40	17	15	0,204
40	4	9	
On-site calls			
No	11	13	1
Yes	10	11	

<sup>†</sup>Maslach e Leiter. Latent burnout profiles: A new approach to understanding the burnout experience. *Burnout Res*, 2016, 3: 89-100

\* Fisher's exact test

## 4. Discussion

Occupational burnout is particularly widespread among surgeons and related to the challenge of the surgical work itself, interpersonal conflict at work, greater demands than resources, the challenge of work-life balance, and the devastating impact of errors and poor patient outcomes [7, 8]. Recognizing that in the past decade, both the awareness and the ability to measure and classify burnout in medical professionals have improved [8], the MBI-HSS questionnaire was elected for its being the most internationally adopted

instrument for burnout investigation, notwithstanding later criticism by its authors who suggested an improved research tool, the so-called Human Services Research for Medical Staff as an alternative research instrument directed to investigating BS in medical professionals [6].

Moreover, a recent review including 182 studies published from 1991 to 2018, and comprising 109,628 individuals from 45 countries, exposed a disparity of BS and burnout prevalence rates among different professions [9]. In the same review, although 85.7% of the analyzed papers had employed the MBI tool, 142 different burnout interpretations were adopted, 47 different burnout prevalence definitions were employed and a wide prevalence rate range,



from 0% to 80.5%, was described. Considering these observations are straightforward evidence of the pending disagreements, the scientific community expect that the last, 2019, World Health Organization BS description [10] may contribute to clarifying this puzzle. Noteworthy, Maslach and Leiter [6] proposed that a respondent who scores high in one or two specific LPA dimensions (EE and DP) would not necessarily be on the way to higher levels of burnout, once the individual might as well recovers, depending on how the situations experienced in the professional activity proceed.

Based on the previous comments, the finding that almost half of the surgeons in the present study ( $n=32$ , 41.6%) could not be allocated in any of the 5 LPA profiles was not surprising. Although our study population was limited, a similarly limited investigation from a northern Brazil reference trauma unit enrolled only 43 surgeons [11], and one must take into account that as it is known that working conditions may vary among institutions and medical specialties [12], it could be better to seek for limiting the sample to enhance uniformity.

While all physicians face the potential for burnout [13], with several studies involving surgeons citing rates up to 40% [3], the low ( $n=5$ , 6%) BS prevalence rate found in our study (Table 7) is not unusual [8]. The academic work environment characteristics of our center may provide for sex-independent knowledge updates and personal scientific progress and consequently attenuate burnout risk. It is also possible that the low BS prevalence rate observed in our study may be a surrogate of the male sex predominance (91% men, Table 3) for it is known that female doctors show significantly lower professional satisfaction as compared to men (77% vs 82%), usually face additional conflicts between the exercise of the profession and the conduction of the household, being more likely responsible for childcare planning, grocery shopping and meal and holidays planning, and present a substantially higher divorce prevalence rate [14-17]. Whether or not our small BS prevalence rate resulted from our surgeons tending to move away from maladaptive coping, and developing various strategies to deal with burnout, namely: cognitive restructuring; seeking social support; stepping aside or down from the job; and prioritizing personal health [7] remains unknown. Although other Brazilian medical centers have also displayed low BS prevalence rates in different medical specialties [18, 19], it is interesting that a 42.6% BS prevalence rate was found among intensive care physicians in the country's northeast [20].

Another BS protecting factor in our academic environment may be the daily interaction with resident physicians might add value and satisfaction to the more senior surgical staff herein investigated [21]. There are also financial considerations linked to the cohort of professors and assisting physicians who hold full-time jobs at the institution, with the inherent revenue tranquility and the attractive benefit of

working at an individual location only, thus avoiding the annoying traffic constraints imposed by the in-between workplace transfers in a large city. Nevertheless, it is of particular interest that our study suffered from a work status imbalance as most surgeons held a part-time job in the institution ( $n = 56$ , 73%) and strived to compensate for the wage limitations inherent to public service. This reasoning might contribute to explaining our findings that a smaller number of surgical days/wk. was associated with higher burnout levels in the MBI-HSS PA dimension. Interestingly, yet, a direct association between higher burnout levels and full-time staff activity was detected by others [17]. Further analysis of this antagonism cannot be contemplated in the present investigation.

Differently from others [22, 23], this study did not include variables like self-medication, reluctance to seek medical care for depression, substance use, or other mental health problems in the data pool. This decision might also have influenced the results.

Finally, the small BS and burnout evidence prevalence rates, together with the considerable number of respondents who did not fit in any MBI HSS profile deterred us from exploring the BS and burnout evidence risk factors in this study. These observations also clearly point out that innovative research tools are required improve BS investigations in centers with a limited number of surgeons.

## 5. Conclusions

Surgery is a demanding career. After many years and long hours of training, the surgeon practicing in high-complexity hospitals is frequently pushed to his or her physical and psychological limits due to more difficult and demanding cases and stressful situations therein cared for and should be intuitively prone to develop burnout. In our high-complexity university public tertiary hospital, the BS prevalence and the burnout evidence prevalence rates were, respectively, 6% and 31.2%. Although no BS risk factor could be detected, a smaller number of surgical days/wk., and full-time staff activity, both accentuated the burnout levels in the personal accomplishment dimension of the MBI-HSS scale. Hopefully, similar studies including novel burnout investigation tools to enhance burnout detection will enhance knowledge on the matter.

## Abbreviations

BS: Burnout Syndrome

MBI-HSS: Maslach Burnout Inventory-Human Services Survey

*i.e.: Id Est*

REDCap: Research Electronic Data Capture

LPA: Latent Profile Analysis

GQ: General Questionnaire

wk.: Week  
 EE: Emotional Exhaustion  
 DP: Depersonalization  
 PA: personal Accomplishment  
 MBI: Maslach Burnout Inventory  
 OR: Operating Room  
 vs: Versus

## Conflicts of Interest

The authors declare no conflicts of interest.

## References

- [1] Balch, C. M., Shanafelt, T. Combating stress and burnout in surgical practice: a review. *Thoracic Surgery Clinics*. 2011, 21(3), 417-430. <https://doi.org/10.1016/j.thorsurg.2011.05.004>
- [2] Brandt, M. L. Sustaining a career in surgery. *American Journal of Surgery*. 2017, 214(4), 707-714. <https://doi.org/10.1016/j.amjsurg.2017.06.022>
- [3] Siegel, T. R., Nagengast, A. K. Mitigating Burnout. *Surgical Clinics North America*. 2019, 99(5), 1029-1035. <https://doi.org/10.1016/j.suc.2019.06.015>
- [4] Al-Ghunaim, T. A., Johnson, J., Biyani, C. S., Alshahrani, K. M., Dunning, A., O'Connor, D. B. Surgeon burnout impact on patient safety and professionalism: A systematic review and meta-analysis. *The American Journal of Surgery*. 2022, 224(1 Pt A), 228-238. <https://doi.org/10.1016/j.amjsurg.2021.12.027>
- [5] Maslach, C., Jackson, S. E., Leiter, M. P. *Maslach Burnout Inventory Manual*. 3rd ed. Palo Alto, CA: Consulting Psychologists Press; 1996, 52 p.
- [6] Leiter, M. P., Maslach, C. Latent Burnout profiles: A new approach to understanding the Burnout experience. *Burnout Research*. 2016, 3(4), 89-100. <https://doi.org/10.1016/j.burn.2016.09.001>
- [7] Al-Ghunaim, T., Johnson, J., Biyani, C. S., O'Connor, D. B. Burnout in surgeons: A qualitative investigation into contributors and potential solutions. *International Journal of Surgery*. 2022, 101, 106613. <https://doi.org/10.1016/j.ijssu.2022.106613>
- [8] Chalkias, P. L., Vosynioti, G. G., Charalampopoulou, M., Vlachakis, D., Darviri, C., Chrousos, G. P., Bacopoulou, F. Burnout in General Surgeons. A Systematic Review. *Advances in Experimental Medicine and Biology*. 2023, 1425, 151-159. [https://doi.org/10.1007/978-3-031-31986-0\\_14](https://doi.org/10.1007/978-3-031-31986-0_14)
- [9] Rotenstein, L. S., Torre, M., Ramos, M. A., Rosales, R. C., Guille, C., Sen, S., Mata, D. A. Prevalence of Burnout among physicians: a systematic review. *JAMA*. 2018, 320(11), 1131-1150. <https://doi.org/10.1001/jama.2018.12777>
- [10] World Health Organization. "Burnout an "occupational phenomenon": International classification of Diseases". Available from [https://www.who.int/mental\\_health/evidence/burnout/en/](https://www.who.int/mental_health/evidence/burnout/en/) [Accessed 27 August 2023]
- [11] Novais, R. N., Rocha, L. M., Eloi, R. J., Santos, L. M., Ribeiro, M. V. M. R., Ramos, F.W.S. Burnout Syndrome prevalence of on-call surgeons in trauma reference hospital and its correlation with weekly workload: cross-sectional study. *Revista Colégio Brasileiro de Cirurgiões*. 2016, 43(5), 314-319. <https://doi.org/10.1590/0100-69912016005003>
- [12] Bratu, I., Heiss, K., Mueller, C., Winthrop, A., Blair, G., Moulton, C.A. Canadian Association of Pediatric Surgeons' State of wellness. *Journal of Pediatric Surgery*. 2019, 54(5), 891-894. <https://doi.org/10.1016/j.jpedsurg.2019.01.014>
- [13] Yates, S. W. Physician Stress and Burnout. *The American Journal of Medicine*. 2020, 133(2), 160-164. <https://doi.org/10.1016/j.amjmed.2019.08.034>
- [14] Pines, A. M. Marriage Burnout: a new conceptual framework for working with couples. *Psychotherapy in Private Practice*. 1987, 5(2), 31-44. [https://doi.org/10.1300/J294v05n02\\_03](https://doi.org/10.1300/J294v05n02_03)
- [15] Dyrbye, L. N., Shanafelt, T. D., Balch, C. M., Satele, D., Sloan, J., Freischlag, J. Relationship between work-home conflicts and burnout among American surgeons: a comparison by sex. *Archives of Surgery*. 2011, 146(2), 211-217. <https://doi.org/10.1001/archsurg.2010.310>
- [16] Tanios, M., Haberman, D., Bouchard, J., Motherwell, M., Patel, J. Analyses of burnout among medical professionals and suggested solutions-a narrative review. *Journal of Hospital Management and Health Policy*, 2022, 6, 1-11. <https://doi.org/10.21037/jhmhp-20-15>
- [17] Dietrich, L. G., Vögelin, E., Dem, M. J., Pastor, T., Gueorguiev, B. Quality of Life and Working Conditions of Hand Surgeons - A National Survey. *Medicina*. 2023, 59(8), 1450. <https://doi.org/10.3390/medicina59081450>
- [18] Magalhães, R. A. C., Glina, D. M. R. Saúde Ética & Justiça, 2006, v. 11, n. 1-2, p. 29-35. <https://doi.org/10.11606/issn.2317-2770.v11i1-2p29-35>
- [19] Becker, N. D., Rocha, A. C., Follador, F. N. C., Wendt, G. W., Ferreto, L. E. D., Fortes, P. N. Burnout syndrome in Brazilian Medical Doctors: a cross-sectional examination of risk and protective factors. *Front Health Serv*. 2021, 16(1), 760034. <https://doi.org/10.3389/frhs.2021.760034>
- [20] Barros, M. M. S., Almeida, S. P., Barreto, A. L. P., Faro, S. R. S., Araujo, M. R. M., Faro, A. S. Síndrome de Burnout em Médicos Intensivistas: Estudo em UTIs de Sergipe. *Trends in Psychology / Temas em Psicologia*. 2016, 24(1), 377-389. <https://doi.org/10.9788/TP2016.1-26>
- [21] Will, K. K., Johnson, M. L., Lamb, G. Team-based care and patient satisfaction in the hospital setting: a systematic review. *Journal of Patient-Centered Research and Reviews*. 2019, 6, 158-71. <https://doi.org/10.17294/2330-0698.1695>
- [22] Muller, D. Kathryn. *The New England Journal of Medicine*. 2017, 376(12), 1101-1103. <https://doi.org/10.1056/NEJMp1615141>

- [23] Rath, K. S., Huffman, L. B., Philips, G. S., Carpenter, K. M., Fowler, J. M. Burnout and associated factors among members of the Society of Gynecologic Oncology. *American Journal of Obstetrics and Gynecology*. 2015, 213(6), 824.e1-824.e9. <https://doi.org/10.1016/j.ajog.2015.07.036>