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BJAN-D-21-00432_Letter to the Editor

Burnout risk among anesthesiology residents in Brazil during the second wave of COVID-19: a cross-sectional survey☆

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Dear Editor,

Anesthesiology residents are historically at high risk of burnout syndrome,[1] and we hypothesized that the Coronavirus Disease 2019 (COVID-19) pandemic could worsen this scenario. Burnout is a global concern[2,3] that could reduce residents' ability to cope with stress and is associated with other mental disorders.[1] We performed a study to determine the prevalence of burnout risk among anesthesiology residents in Brazil during the second wave of the COVID-19 pandemic. The secondary objective was to recognize factors that could correlate to the risk of developing burnout. Identifying these factors could lead to building more resilient training centers.

This survey-based nationwide cross-sectional observational study measured burnout risk among anesthesiology residents in Brazil using the Oldenburg Burnout Inventory (OLBI). We collected data through a multi- modal non-probability online survey using both river (social media) and panel (Brazilian Society of Anesthesiology's mailing list) sampling from January 12 to March 2, 2021. All three years of in-training anesthesiologists were invited to participate. Ethical approval was obtained from the institutional review board at Fundação ABC/FMABC before the study started (CAAE number 39505120.7.0000.0082). The study protocol and report followed the STROBE statement. The survey included the Oldenburg Burnout Inventory (OLBI) and 24 additional questions. OLBI's measurement was validated in order to quantify the risk of burnout based on two dimensions: exhaustion and disengagement. The cultural adaptation and validation of OLBI for the Brazilian population resulted in an instrument with 13 questions.[4] We assumed that a proper cut-off to determine burnout risk should have clinical meaning. A relevant clinical relationship has been previously described by Peterson et al.,[2] who identified that values of OLBI beyond their

national validation mean could prospectively predict future long-term sickness absence. In parallel, we used the national mean of OLBI as cut-off, as determined by the Brazilian validation. The mean scores found in the Brazilian validation study were 2.33 for exhaustion and 2.4 for disengagement.[4] Thus, the OLBI's cut-off level 4.73 was defined by adding both dimensions' means. Residents were considered "at-risk" of developing burnout when their score was beyond 4.73, while scores simultaneously beyond the mean for exhaustion and disengagement defined "high risk" of burnout. The following 24 questions of the survey were designed to potentially define factors correlated with the risk of burnout. We tried to minimize sampling bias by inviting residents through methods that allowed participation from all country regions. Lack of validation of the correlation questions was minimized by the input of variables from previous burnout literature. Since the answers relied on a non-probabilistic sampling method, no statistical power calculation was determined. Standard descriptive statistics were used to summarize the results. Baseline characteristics were compared to the target population with a two-sample test of proportion. All 24 correlation questions were analyzed by two logistic regressions, one with the binary outcome "at-risk" and the other with the binary outcome "high risk" of burnout. Significant results from those regressions were included in a final multiple linear regression model with the OLBI score as the dependent variable. Beta coefficients were calculated to standardize the correlations. Beta coefficients above or equal to 0.2 were considered to determine the strength of correlation as moderate to strong, while we assumed values below 0.2 as weaker correlations. Semipartial coefficients of determination were calculated to determine the percentage of association between the OLBI score and each potential predictor. Statistical significance was considered at the level of 0.05 for two-sided hypothesis testing, and confidence intervals were set at 95%. Data were analyzed with STATA 17.0 (StataCorp, 2021). Participants who did not complete all forms were excluded from the analysis.

Answers were completed by 205 participants. The survey completion rate was 91.5%, given that 224 guests signed the e-consent, and the response rate was 9.3%, considering a

target population of 2205 residents. The age of participants was 29.9±3.12. Assuming an equal distribution of residents by training year in the target population (33%), there was no significant difference from our sample. Female participants accounted for 107 (52.2%) residents. All regions of Brazil were represented with a similar proportion to the residents' in-training national distribution, except for a higher proportion in the Southeast region (73.2% in a target population of 61.9%). The prevalence of anesthesiology residents at-risk of developing burnout was 73.2%, while it was 57.1% for high risk. During the outbreak of the COVID-19 pandemic, data collected from medical residents in Brazil by Mendonça et al.[5] showed a 48.6% risk of developing burnout. Compared to our result of 73.2%, it is possible that anesthesiology residents could possibly be at higher risk of burnout than other medical residents in Brazil. While regarding high risk, a study conducted among Brazilian anesthesiology residents in 2018 showed that 29.72% of participants were at high risk of developing burnout.[1] Compared to our observation of 57.1%, an increase in the high risk of developing burnout in anesthesiology residents during the COVID-19 pandemic could be assumed.

Access to diagnostic testing of COVID-19 provided by the residency program was the most important protective factor against burnout risk (Table 1), accounting for 7.2% of its variance. On the other direction, having considered abandoning the anesthesiology training due to the pandemic was the main contributor to burnout risk (Table 1), accounting for 8% of OBLI variation. Such characteristic was also observed among neurosurgery residents in the USA.[3] It is likely that the desire to quit anesthesiology training should signal the need for support.

Interpretation of these results should consider that the non-probabilistic sampling could compromise generalizability. A low response rate could imply high non- response bias, although the population demographic was similar to the target population in most possible comparisons. Also, the lack of validation of the correlation questions could represent imprecision in participants' answers.

In conclusion, anesthesiology residents' risk of burnout in Brazil during the second wave of the COVID-19 pandemic was critical. Providing access to COVID-19 testing was correlated with protection, whereas the desire to quit training was associated with increased risk. Acknowledging the high prevalence and factors related to burnout risk could support training centers' decision-making.

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Conflicts of interest

The authors declare no conflicts of interest.

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Table 1 Multiple linear regression for total OLBI score as the dependent variable.

Covariates		n (%) Mean±SD	OLBI score (Mean±SD)	β	Coef. (95% CI)	Semipartial R^2	*p*-value
Access to COVID-19 tests through the residency program	Yes	119 (58.0%)	5.06±0.92	-0.27	-0.52 (-0.74 – -0.29)	0.072	<0.001[a]
	No	86 (42.0%)	5.61±0.86				
Alcohol consumption	Yes	159 (77.6%)	5.17±0.93	-0.22	-0.49 (-0.75– -0.29)	0.044	<0.001[a]
	No	46 (22.4%)	5.70±0.84				
Institutional COVID-19 prevention protocol	Yes	157 (76.6%)	5.16±0.91	-0.19	-0.43 (-0.69– -0.17)	0.037	0.001[a]
	No	48 (23.4%)	5.70±0.91				
Age		29.9 ±3.12	5.29±0.93	-0.18	-0.05 (-0.09– -0.01)	0.027	0.005[a]
Relocation to COVID-19 ICU/ward	Yes	90 (43.9%)	5.26±0.93	-0.15	-0.29 (-0.52– -0.06)	0.020	<0.001[a]
	No	115 (56.1%)	5.31±0.95				
Year of residency	1	87 (42.4%)	5.23±0.90				

	2	70 (34.1%)	5.31±0.99	0.05	0.97 (-0.15–0.35)	0.002	0.446
	3	48 (23.4%)	5.36±0.92	0.11	0.26 (-0.02– -0.54)	0.011	0.071
Felt coerced or pushed to assist patients with COVID-19	Yes	99 (48.3%)	5.52±0.85	0.18	0.33 (0.10–0.56)	0.028	0.005[a]
	No	106 (51.7%)	5.08±0.97				
Considered abandoning the anesthesiology training due to the pandemic	Yes	49 (23.9%)	5.78±0.90	0.29	0.64 (0.38–0.90)	0.080	<0.001[a]
	No	156 (76.1%)	5.14±0.89				

Number of observations: 205; $R^2 = 0.334$; F=10.90; $p < 0.0001$.

β, Beta coefficient represents standardized correlations; $\beta \geq 0.2$ determined moderate to strong correlation. Coef, Regression Coefficient; 95% CI, 95% Confidence Intervals; Semipartial R^2, represents the proportion of variance in OBLI score that a single variable can explain.

[a] p-value < 0.05.