



ORIGINAL ARTICLE

Psychological impact of the COVID-19 pandemic and burnout severity in French residents: A national study[☆]



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Abstract

Background and objectives: We measured the impact of the COVID-19 pandemic on the mental health and burnout of French residents.

Methods: Residents completed a questionnaire assessing their personal life, work, social relationships, mental health, burden and psychological impact of the pandemic. The Maslach Burnout Inventory (MBI) allowed to identify 5 classes of burnout of increasing severity: burnout free, intermediate, 1, 2 or 3 dimensions severely impacted. Variables significantly linked with burnout, defined as having a high impact on at least one of the 3 dimensions of the MBI, were entered into a logistic regression.

Results: There were 1050 responses. Mean age was 27 ± 2 years. Since the start of the pandemic, only one resident in four said they were in their normal state of mind, more than half felt tired and one third anxious and/or stressed and/or depressed. The total burnout rate was 55%. There was a strong link between the severity of the burnout syndrome and the impact of the pandemic. 7 factors were independently linked to burnout: number of monthly calls ($p < 0.001$), psychiatric history ($p < 0.001$), interpersonal conflicts ($p = 0.002$), desire to quit the specialty ($p = 0.002$), fatigue ($p = 0.004$), job satisfaction ($p = 0.004$), and depression ($p = 0.05$).

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Conclusion: Caring for Covid positive patients was not the most important cause of burnout, but there was a strong relationship between burnout severity and psychological impact of the pandemic.

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Introduction

As of this writing, the Coronavirus disease (COVID-19) pandemic has killed more than two million people worldwide and many intensive care units had been overwhelmed with patients presenting with respiratory distress.

Health care workers are at a higher risk of exposure than the rest of the population and in Europe, many caregivers have been infected. In a Chinese survey comparing non-medical health workers and medical health workers during the epidemic, the latter had a higher prevalence of insomnia, anxiety and depression.¹

Burnout syndrome (BOS), another kind of epidemic,² has become a matter of concern for doctors. 62% of French anaesthesia residents (AR) had shown signs of burnout in a previous French study and among them, many had shown signs of depression.³ Several recent studies have found an increased level of burnout in health care professionals exposed to the pandemic.⁴⁻⁶ At the opposite, some studies found that burnout level could be lower in physicians who actively fought with the virus.⁷

Faced with the huge burden imposed on critical care, the main objective of this cross-sectional, national survey was to measure the impact of the COVID-19 pandemic on French residents' mental health. Secondary objectives were to measure burnout in this at-risk population and to explore whether the pandemic could explain part of this burnout.

Methods

Population

Between March 7 and March 21, 2020, French residents received an e-mail from four French databases involving dermatology, anesthesiology residents and residents of all other specialties: the FDVF (Association Futurs Dermato-Vénérologues de France), the CNEAR (Collège National des Enseignants d'Anesthésie et de Réanimation), the AJAR (Association des Jeunes Anesthésistes Réanimateurs) and the SIHP (Syndicat des Internes des Hôpitaux de Paris).

These e-mails comprised a link to an online survey assessing their personal life, work, mental health and the impact of the pandemic. It was anonymized and processed electronically in accordance with the MR004 reference methodology, as required by the French National Commission (CNIL Number: 2217450 v 0). An ethical approval was not necessary but all respondents gave a written informed consent.

Questionnaire

The first questions evaluated demographics and job characteristics. Work was evaluated by the number of night calls and weekly hours spent at work.

The burden of the pandemic was evaluated by the number of Covid positive patients managed, of Covid patients mechanically ventilated, and of deaths among them. Questions explored the number of colleagues and senior doctors known to be infected with COVID-19.

Residents were asked whether they had been infected with COVID-19, whether they feared getting infected or were worried about their own existence. They were asked whether they had friends or relatives infected with COVID-19 and whether they worried about the life of their loved ones.

Four items were measured on a numeric scale from 0 to 10: Impact of the epidemic on personal life, current fatigue, personal life and job satisfaction.

Mental health was explored with categorical variables about anxious and depressive feelings: psychiatric history, taking psychiatric medication, perception of mental state, feeling lonely, facing medical decisions alone, having difficulty concentrating or making decisions, self-blaming, deteriorated sleep, eating disorders, tobacco and/or alcohol consumption and suicidal thoughts. Residents were asked whether they felt they were useful, overwhelmed by the epidemic or confronted with decisions that conflicted with their ethics. They were asked about potential interpersonal conflicts and improvement or deterioration of social relationships. Residents were finally asked whether they would choose the same specialty if they could start over again.

There were questions about the confidence in the French healthcare system. They were also asked whether they had received clear procedures and training in the management of COVID-19 patients.

Finally, the respondents had to answer the 22 items of the Maslach Burnout Inventory (MBI) on the classic Likert scale, rated from never (0) to every day (6). Scores at specific items enabled to rate the severity of BOS among the three subscales (dimensions) of the MBI: emotional exhaustion (EE), depersonalization (DP) and personal accomplishment (PA). The cut-off values⁸ were those most commonly admitted in France to distinguish between low, average and high intensity in each dimension (values for average EE, DP and PA were 18-29, 6-11 and 34-39 respectively). A person is considered to be experiencing burnout if at least one of the 3 dimensions of the MBI is highly impacted (high score for EE and DP or low score for PA).

In parallel to this dichotomic variable, we distinguished five different classes of burnout of increasing severity: burnout free, intermediate, highly impacted on 1, 2 or 3 dimensions.

Statistical analysis

Normality of distribution was tested with the Kolmogorov–Smirnov test.

Continuous values were expressed as means and standard deviations or medians and interquartile range (IQR Q1–Q3), and categorical variables as counts and percentages. The comparisons of continuous values between groups were performed with Mann–Whitney rank-sum tests and within the 5 classes of burnout with the Kruskal–Wallis test. The statistical link between numerical variables was tested according to the value of Pearson’s correlation coefficient. Categorical variables were compared using the Chi-square test.

Finally, variables found to be significantly linked with burnout with a p value < 0.01 at the univariate comparisons were entered into a model of logistic regression. The significance of the model estimators was tested by the Wald test and the model was finally tested by a fit test.

All comparisons were two-tailed, $p < 0.05$ was considered statistically significant and the Bonferroni correction was not deemed necessary because a multivariate analysis was planned.

All statistical analyses were performed with StatEL package (AdScience).

Results

We have obtained 1055 responses of which 1050 were valid for the study (Fig. 1). The Kolmogorov–Smirnov test showed that data was not normally distributed, so non parametric tests were chosen for comparisons.

There were 612 (58%) AR. Among non-AR, 194 were of medicine specialties, 47 of surgical specialties, 47 were psychiatrists, and 33 worked in emergency departments. Sixty-five percent of the answers came from Ile de France. The Response rate was 35% for AR and 11% for other residents. The residents’ mean age was 27 ± 2 years (22–37). There were 609 (58%) women (men 42%). 396 (38%) had a partner who was a healthcare professional.

339 residents (32%) worked weekly more than 60h. The median number of monthly night calls since the start of the epidemic was 5 (IQR 3–6). This number had increased for 525 residents (50%) since the beginning of the pandemic.

Mental health

767 residents (73%) had no medical history. There were histories of depression: 85 (8%), anxiety: 174 (17%) and insomnia: 117 (11%).

Since the start of the pandemic only 262 residents (25%) said they were in their usual state of mind, 565 (54%) felt tired, 92 (9%) exhausted, 319 (30%) stressed, 329 (31%) anxious and 124 (12%) said they were depressed. A notable proportion of residents exhibited symptoms of depression: 339 (32%) had difficulty concentrating or making decisions,

440 (42%) tended to blame themselves, sleep deteriorated in 502 (48%), 149 (14%) had eating disorders. 32% felt alone in difficult situations.

33% consumed alcohol and 22% had increased their consumption since the beginning of the pandemic. 22% smoked and 26% had increased their consumption since the pandemic.

Results concerning the pandemic

The weekly median number of Covid positive patients treated by each resident was 9 (IQR 3–15). It was 3 (IQR 0–10) for intubated, Covid positive ICU patients and 2 (IQR 0–4) for Covid positive patients who died.

On a scale of 0–10, the average impact of the pandemic on personal life was 7.1 ± 2.1 , overall satisfaction at work 6.2 ± 2.1 and the overall feeling of fatigue 6.0 ± 2.3 .

There was a significant correlation between the total number of Covid positive patients treated and the impact of the pandemic on personal life ($r = 0.125$, $p < 0.00005$), fatigue ($r = 0.21$, $p < 0.00001$), job satisfaction ($r = 0.07$, $p < 0.025$) and the class of burnout ($r = 0.097$, $p < 0.002$). Thus, the coefficients of determination R^2 were very low (between 1% and 5%).

To the question “have you been infected with COVID-19?”, 66 (6%) answered “yes”, 437 (42%) were symptomatic but had not been tested. The median number of colleagues or senior doctors known to be infected with COVID-19 was respectively 3 (IQR 1–5) and 2 (IQR 1–4) per asked individual.

Four hundred seventy-four residents (45%) feared being infected with COVID-19, 253 (27%) worried about their own existence, 763 (73%) had friends infected with COVID-19 and 274 (26%) had relatives infected; 92% worried about the life of their loved ones.

614 (58%) thought that the French healthcare system was not large enough to deal with the pandemic. In contrast, 796 (76%) thought the organization of their own medical department was appropriate. 517 (49%) had received training in the management of COVID-19 patients and 745 (71%) had clear procedures.

782 (74%) felt they were useful, but 232 (22%) felt overwhelmed by events. 429 (41%) of residents were confronted with decisions that conflicted with their ethics.

358 (34%) thought the pandemic had improved the relationships within their work team, 212 (20%) thought that they had deteriorated instead. Regarding relationships within the family, couple relationships had improved for 74 (7%), but deteriorated for 210 (20%).

Burnout

Among the 1050 residents, 578 were highly impacted on at least one of the dimensions of the MBI, putting the total burnout rate at 55% (Fig. 2). 13% of residents had high EE scores, 37% exhibited high scores on DP and 28% low scores on PA. Mean values were 17.3 ± 9.8 for EE, 9.8 ± 6.1 for DP and 36.5 ± 7.1 for PA. There was no significant difference in burnout prevalence between men and women, AR and non-AR, neither between Ile de France and others French regions.

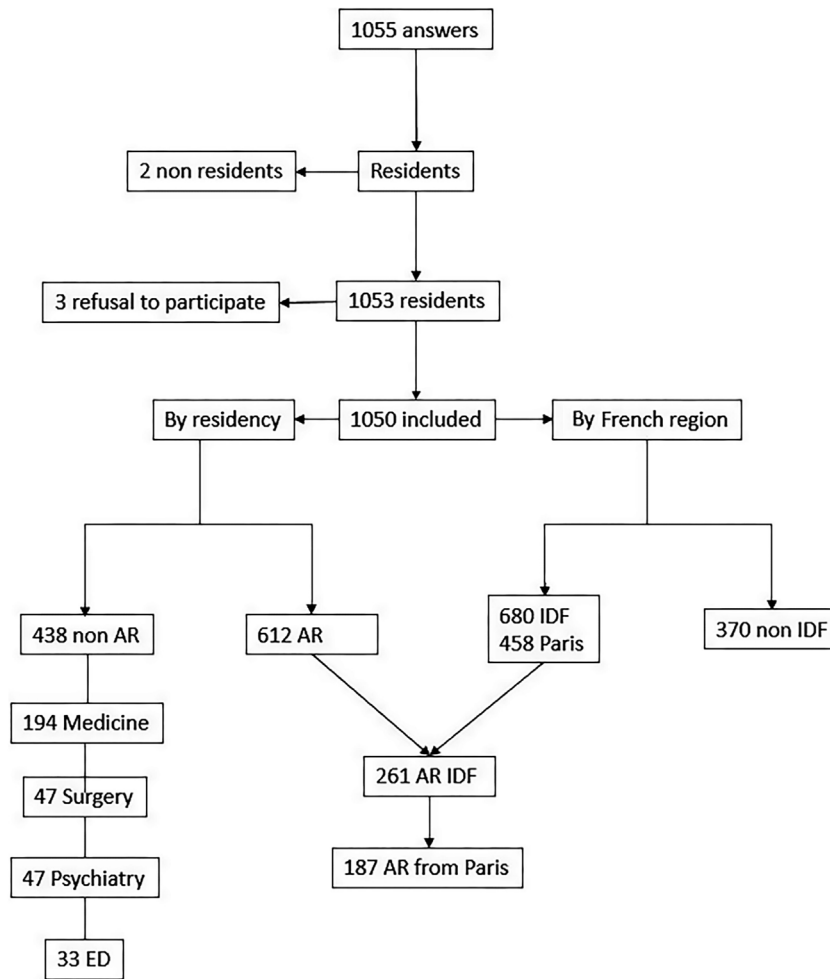


Figure 1 Flow-chart of the answers to the questionnaire.

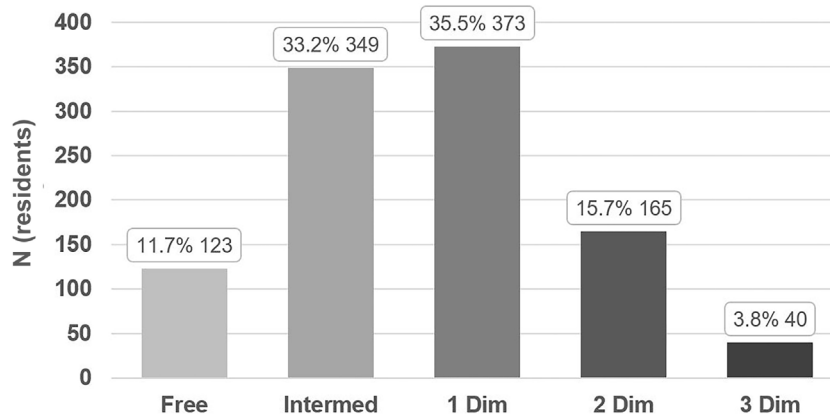


Figure 2 Distribution of the five predefined burnout classes: burnout-free (all 3 dimensions in the low burnout subset), one, two or three dimensions severely impacted, and intermediate cases: all other cases.

There was a significant correlation between burnout class and time spent at the workplace each week, number of on-call calls, number of Covid positive patients treated and number of Covid positive patients who died. The perception of the impact of the pandemic on personal life and fatigue increased with burnout, satisfaction in personal life and

job satisfaction decreased with the worsening of burnout (Table 1).

The classes most affected by burnout were also those who felt they had been the least trained in the care of Covid positive patients, who benefited the least from clear procedures for the care of these patients and who felt the least

Table 1 Mean values for the numerical variables among the five burnout classes, with the value of the statistic of the Kruskal–Wallis test and the p value for univariate comparisons between classes.

	Covariates	Free	Inter	1 dim	2 dim	3 dim	KW	p
	N in each class of BOS	123	349	373	165	40		
	Percent by classes	12	33	36	16	4		
MBI	Emotional exhaustion	8.2	14.2	17.2	25.8	38.1	342	0.00001
	Depersonalization	2.8	6.7	11.8	15.2	18.7	525	0.00001
	Personal achievement	43.6	39.4	35.1	31.0	25.5	398	0.00001
On Call	Number of monthly calls	3.9	4.6	5.0	4.8	5.5	19.2	0.0007
Pandemic	Covid positive patients/week	9.1	10.5	11.8	12.7	13.8	14.5	0.0059
	Covid patients intubated/week	5.4	6.0	6.6	7.0	9.7	8.0	0.092
	Covid patients deceased/week	2.5	2.6	3.0	3.1	4.2	8.0	0.091
	Number of colleagues infected	2.7	3.4	3.5	3.7	3.4	9.4	0.052
	Number of senior doctors infected	2.1	2.4	2.8	2.5	3.4	11.6	0.02
Global feeling	Impact epidemic/personal life	6.5	6.9	7.1	7.5	8.0	30.6	0.00001
	Personal life satisfaction	6.8	6.0	5.9	5.0	5.5	48.0	0.00001
	Job satisfaction	7.2	6.5	6.3	5.2	4.1	95.2	0.00001
	Current fatigue	5.1	5.7	6.0	6.9	7.5	67.5	0.00001

protected from contamination. Similarly, as burnout worsened, residents felt less and less useful and more and more overwhelmed by the pandemic (more than 50% for the class of most severe burnout, [Table 2](#)).

The anxiety-provoking feelings (feeling of loneliness with regard to decisions to be made, ethical conflict) and conflicts increased with the severity of burnout, as did depressive symptoms. Finally, residents in burnout were more likely to stop their career ([Table 2](#)).

While the proportion of contaminations or close relatives infected was roughly the same in the five classes, fear of contagion, worry of losing life or worry for loved ones were much stronger as the burnout got worse ([Table 2](#)).

In the logistic regression ([Table 3](#)), exposure to the pandemic (number of COVID-19 patients taken in charge, impact of pandemic on personal life, feeling of being overwhelmed, of being lonely, facing ethical conflicts, benefiting of clear procedures and being worried for loved ones), personal life satisfaction and weekly work hours were not independent burnout factors. Seven factors were independently linked to burnout: the number of monthly calls ($p < 0.0004$), psychiatric history ($p < 0.001$), desire to quit the specialty ($p < 0.002$), interpersonal conflicts ($p < 0.002$), fatigue ($p < 0.004$), job satisfaction ($p < 0.004$), and symptoms of depression ($p < 0.05$).

Finally, we compared burnout prevalence in Anesthesia Residents with its prevalence in our previous work in 2009 in France: there was no significant difference in prevalence of burnout between 2020 (burnout in AR = 58%) and 2009 (burnout in AR = 62% ($\text{Chi}^2 = 0.77$, $p = 0.38$)).

Discussion

This cross-sectional, observational study, undertaken at the top of the pandemic in France, found that residents' mental health was significantly impacted by the COVID-19 pandemic.

Since the start of the pandemic, only 25% said they were in their usual state of mind, more than half felt tired, one

third exhibited symptoms of depression. Twenty-two percent felt overwhelmed by events and 41% were confronted with decisions that conflicted with their ethics.

Moreover, the study found a high burnout rate, 55%, among French residents. Interestingly, the impact of the COVID-19 pandemic was felt all the more severely as the severity of the BOS increased.

Several Chinese works have pointed out that the COVID-19 pandemic increased distress, anxiety and depression^{9–12} Several studies showed that the burnout frequency was lower in groups working on the front lines than usual ward groups.^{7,13} This corresponds with our observation that the number of Covid positive patients taken in charge correlates to job-satisfaction.

We showed that 45% of residents feared being infected with COVID-19, and 27% worried about their own existence. The rate of these feelings regularly increased with increasing severity of burnout. Although the rate of infected relatives was roughly the same for these five classes, the more severe the burnout, the more anxiety increased about the health and safety of loved ones. The same observation applies to the confrontation with ethical conflicts, the feeling of being overwhelmed by the pandemic and for the deterioration of social relationships. Thus, there is a strong relationship between burnout and anxiety levels.

In the multivariate analysis, the factors independently linked to burnout were not the number of Covid positive patients taken in charge or other covariates related to the pandemic. Of note, the intensity of the correlation between the number of Covid positive patients looked after and the psychological impact of the pandemic was very low. It seems that the pandemic itself explains a rather small proportion of mental state and burnout, the causes of which are probably globally the same as during the preceding decade.^{14,15} This is in line with the fact that the burnout level between 2009 and 2020 was the same in AR. One alternative hypothesis could be that the burnout level translates in some individuals into a psychological frailty that could explain part of the relationship between the level of anxiety and other

Table 2 Proportions among the five burnout classes for each of the categorical variables, with the Chi² value and the corresponding p value for univariate comparisons between classes.

	Covariates	Free	Inter	1 dim	2 dim	3 dim	CHI ²	p
Gender	Women	59	60	53	65	63	8.5	0.07
Work	More than 60 weekly hours	33	26	31	33	55	21.1	0.01
	Being an Anesthesia Resident	49	57	62	58	60	7.1	0.13
	Increased number of night calls	40	50	51	53	53	6.0	0.20
Pandemic	Covid training	57	50	51	44	28	13.0	0.01
	Covid procedures	77	72	74	60	60	15.9	0.003
	Feels protected from Covid	67	60	55	47	43	17.8	0.001
	Contaminated residents	11	6	5	4	8	6.7	0.08
	Fear of being contaminated	42	52	54	61	55	9.7	0.045
	Fear (a lot) of being contaminated	4	7	8	13	13	9.9	0.02
	Worried (a lot) about his own life	1	5	3	5	4	1.0	0.32
	Contaminated relatives	26	22	28	29	28	4.8	0.31
	Worried about loved ones	25	40	42	54	63	31.7	0.00001
	Faced with ethical conflicts	39	36	40	50	58	14.6	0.006
	Police control during traveling	40	48	43	42	75	17.9	0.002
Depression	Psychiatric history	16	20	28	34	50	30.6	0.00001
	Feel depressed	3	8	10	25	35	20.8	0.00001
	Feel alone (with decisions)	20	31	36	52	78	63.5	0.00001
	Feel overwhelmed	9	18	20	38	53	63.1	0.00001
	Concentration problems	10	30	31	47	73	76.2	0.00001
	Tendency to self-blame	16	38	41	63	75	83.9	0.00001
	Eating disorders	4	10	16	21	43	47.8	0.00001
	Sleep deterioration	37	46	48	54	68	14.4	0.006
	Suicidal thoughts	0	1	3	7	13	16.1	0.0001
	Increase in alcohol consumption	13	18	20	25	33	10.8	0.03
	Increase in tobacco consumption	13	17	16	14	23	3.0	0.55
	Taking drug	4	6	3	4	3	2.6	0.11
	Taking medication	5	9	10	14	35	7.9	0.01
	Wants to stop the specialty	1	1	4	15	25	27.2	0.00001
Social	Deteriorated relationships (family)	88	85	77	73	63	23.9	0.0001
Relationships	Conflicts with superiors	10	19	25	38	55	54.6	0.00001
	Conflicts with colleagues	14	20	23	25	48	21.9	0.0002
	Conflicts with patients	3	9	14	19	25	23.0	0.00001
	Conflicts with families of patients	13	21	24	30	30	14.3	0.007
Opinions	Good service organization	89	79	77	61	63	35.9	0.00001
	Confidence in the health system	38	31	28	24	20	9.6	0.048

symptoms of depression with the burnout severity. Of course, the present transversal study is not designed to analyse the causality between the burnout level and the intensity of the psychological impact of the pandemic. Only a longitudinal study could answer this question.

Indeed, meta-analysis¹⁶ or recent studies^{2,17} found a BOS in half of doctors and more than half in residents.^{18–22} We did not specifically ask questions about bullying or harassment,^{23–25} but in additional comments, several residents mentioned instances of harassment by doctors in charge of units. A recent meta-analysis showed that the overall pooled prevalence of intimidation, harassment, and discrimination in residents was 64%²⁶ and residents who report these problems are more likely to have symptoms of burnout.²⁷

Even if this is arguable,²⁸ a growing body of evidence shows that BOS shares a lot of the characteristics of a true depression^{29,30}; a reactional depression to a pejorative work

environment, one might say. The MBI is to date the “gold standard” for burnout screening, even though there are concerns about the very nature of each of the 3 dimensions and about the chosen cut-off values to define the severity of the threat. As we observed in 2009,¹ there is a strong link between the burnout severity class, the MBI scores in each dimension and the intensity of symptoms, which confirms that burnout is a progressive disorder rather than a dichotomous one. It appears that residents with high intensity scores in the three burnout dimensions (in the present study, 4% of residents) are particularly at risk. Indeed, these considerations seem important in that burnout may be associated not only with suicide, but also with malpractice.^{31,32}

Limitations of the study

As with most survey studies, the responder population, composed mainly of AR (58%) and of residents from Ile de France

Table 3 Logistic regression. Burnout is the dependent variable.

Covariable	Estimator	SD	Wald	p	OR	IC OR (95%)
Constant	−0.66	0.516	−1.270	0.20		
Monthly calls	0.11	0.031	3.534	0.0004	1.12	[1.05–1.19]
Psychiatric history	0.53	0.165	3.203	0.001	1.70	[1.23–2.34]
Desire to quit the specialty	1.40	0.458	3.052	0.002	4.05	[1.65–9.95]
Interpersonal conflicts	0.24	0.080	3.042	0.002	1.28	[1.09–1.49]
Fatigue	0.11	0.037	2.910	0.004	1.11	[1.04–1.20]
Job satisfaction	−0.12	0.041	−2.883	0.004	0.89	[0.82–0.96]
Symptoms of depression	0.30	0.148	1.999	0.046	1.34	[1.01–1.80]
Weekly work hours	−0.22	0.125	−1.773	0.08	0.80	[0.63–1.02]
Impact on personal life	0.04	0.036	1.140	0.25	1.04	[0.97–1.12]
Service organisation	−0.22	0.193	−1.131	0.26	0.80	[0.55–1.17]
Sleep	−0.16	0.150	−1.052	0.29	0.85	[0.64–1.15]
Being overwhelmed	0.10	0.109	0.956	0.34	1.11	[0.90–1.37]
N Covid positive patients	0.01	0.007	0.945	0.34	1.01	[0.99–1.02]
Clear procedures	0.14	0.167	0.844	0.40	1.15	[0.83–1.60]
Being lonely	0.13	0.155	0.842	0.40	1.14	[0.84–1.54]
Ethical conflicts	−0.10	0.151	−0.647	0.52	0.91	[0.68–1.22]
Feeling protected from Covid	−0.10	0.151	−0.638	0.52	0.91	[0.67–1.22]
Life satisfaction	−0.02	0.035	−0.627	0.53	0.98	[0.91–1.05]
Worried for loved ones	0.15	0.257	0.584	0.56	1.16	[0.702–1.924]

(65%), may be somewhat different from the total French resident population.

Like other published studies, this is a purely descriptive study and the statistical link should not be confused with a causal relationship between BOS and analysed covariates.

Some questions have not been raised (e.g., autonomy regarding medical decisions, occurrence of medical errors, moral or sexual harassment, etc.) as one of the expected success factors of this questionnaire was the ability to complete it in about ten minutes.

Conclusion

A large part of French residents exhibited symptoms of anxiety and depression, exacerbated by the COVID-19 pandemic. For Anesthesia Residents at least, although the context is quite different because of the pandemic, burnout prevalence in the present study was found to be not different from the results of our previous work, twelve years ago.

The increasing workload did not appear to be the prominent explaining factor of either the psychological consequences of the pandemic or the burnout level.

Of course, the pandemic has been shown to increase the burnout level in healthcare professionals, but despite the fact that our work was not intended to look at the consequences of burnout prevalence on the aftereffects of the pandemic, one alternative hypothesis could be that burnout severity itself could be a factor explaining part of the strength of the psychological impact of the epidemic in some individuals.

Ethical considerations

An ethical approval was not necessary but all respondents gave a written informed consent. The questionnaire was

anonymized and processed electronically in accordance with the MR004 reference methodology, as required by the French National Commission (CNIL Number: 2217450 v 0).

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Conflict of interest

None to declare by the authors.

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