

Assessment of Sleep Features, Mental Health Outcomes, and Alcohol and Tobacco Consumption in Residents and Fellows in Otolaryngology Before and During the COVID-19 Pandemic

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IMPORTANCE The workload of many residents and fellows in otolaryngology–head and neck surgery has particularly increased during the COVID-19 pandemic; however, outcomes associated with mental health status and sleep remain unclear.

OBJECTIVE To assess the sleep, mental status, and alcohol and tobacco consumption habits of residents and fellows before the COVID-19 pandemic (before March 10, 2020) and during the pandemic period (after March 10, 2020).

DESIGN, SETTING, AND PARTICIPANTS This cohort study included residents and fellows of 6 university hospitals of European regions with a high prevalence of COVID-19 cases. Survey development, data collection, and analyses were performed from March 10, 2020, to June 30, 2021.

MAIN OUTCOMES AND MEASURES Residents and fellows were invited to respond to a survey assessing management of treatment in patients with COVID-19 and related work features; stress and mental health status (Beck Depression Inventory); sleep features (Insomnia Severity Index); and alcohol and tobacco consumption.

RESULTS Of 220 potential participants, 128 residents and fellows (58.2%) completed the evaluations. No demographic data on mean (SD) age and sex or gender were collected. The prepandemic mean (SD) score of the Beck Depression Inventory (3.1 [2.8]) significantly increased after the start of the pandemic (mean [SD] score, 4.2 [4.1]; difference, -1.1; 95% CI, -1.96 to -0.24; $d = 0.31$), and the prepandemic mean (SD) score of the Insomnia Severity Index (4.9 [4.1]) significantly increased after the start of the pandemic (mean [SD] score, 6.0 [4.9]; difference, 1.1; 95% CI, 0.00-2.2; $d = 0.25$). Insomnia concerned 46% of participants (51 of 112), and depression concerned 47% of participants (55 of 116) during the pandemic. The mean (SD) prepandemic alcohol consumption (1.7 [2.3] IU per week) significantly increased after the start of the pandemic (mean [SD], 2.9 [4.0] IU per week; difference, 1.2; 95% CI, 0.40-2.00; $d = 0.37$). Residents and fellows who were mobilized in COVID-19 units reported significant increases of workload ($r = 0.2$; 95% CI, 0.1-0.3), stress level ($r = 0.2$; 95% CI, 0.1-0.3), and alcohol consumption (for 5-10 IU per week: mean [SD] prepandemic, 11 [8] IU per week vs postpandemic, 20 [16] IU per week; $d = 0.37$) and a worsening of sleep status (for moderate insomnia: mean [SD] prepandemic Insomnia Severity Index, 4 [3] vs postpandemic, 15 [12]; $d = 0.25$). There was a significant association between alcohol consumption and the Beck Depression Inventory score ($r = 0.4$; 95% CI, 0.2-0.6). The mean (SD) consumption of tobacco decreased from 2.1 (1.3) to 0.9 (1.5) (difference, -1.20; 95% CI, -1.50 to -0.85; $d = 0.85$).

CONCLUSIONS AND RELEVANCE Results of this cohort study suggest that the workload of residents and fellows increased during the pandemic, which may be associated with a worsening of mental health and sleep status and an increase of alcohol consumption.

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Residency and fellowship are stressful training periods associated with work hours, work-life balance, and the risk of burnout.¹ The impairment of the well-being of young physicians concerns 35% to 86% of young residents in US² and was associated with individual dysfunction, reduction of productivity, and quality of patient care.^{2,3} A recent study⁴ reported that the occurrence of mental health disorder and burnout in US residents in surgery may be associated with an increase of the consumption of tobacco and alcohol. During the COVID-19 pandemic, a US study⁵ found that workload, stress, sleep disorders, and anxiety substantially increased in residents and fellows in otolaryngology-head and neck surgery (hereinafter, residents and fellows), especially those who worked in COVID-19 units.

The objective of this cohort study was to evaluate sleep, mental status, and alcohol and tobacco consumption of residents and fellows before the COVID-19 pandemic (before March 10, 2020) and during the pandemic period (after March 10, 2020).

Methods

For this cohort study, survey development, data collection, and analyses were performed from March 10, 2020, to June 30, 2021. Throughout this period, 220 residents and fellows of 6 European University hospitals were invited to complete an online survey (SurveyMonkey Inc), so that each participant could complete the survey only once. The survey was developed in iterative fashion by a group including 5 otolaryngologists (E.C., C.M., C.E., M.R.B., S.H., and J.R.L.), 1 linguist, and 1 psychiatrist. The selected hospitals were located in areas with a high prevalence of COVID-19 cases, including hospitals of Paris and Marseille (France), Brussels (Belgium), San Sebastian (Spain), and Verona and Naples (Italy). The survey was emailed 3 times to residents and fellows at the facilities to increase the participation rate. This study followed the Strengthening of Reporting of Observational Studies in Epidemiology (STROBE) reporting guideline for cohort studies. The ethics committee of Foch Hospital, Paris, France, determined that approval was not required for this study.

The questions were chosen to identify the consumption of alcohol and tobacco by residents and fellows before and through the pandemic period, as well as their mental and sleep status during the pandemic. Participants were asked to respond to questions by recalling information from before the pandemic. The final version of the survey included 23 questions divided into 6 sections: general information; management of treatment of patients with COVID-19 and related work features; stress and mental health status; sleep features; alcohol consumption; and tobacco consumption (eAppendix 1 in the Supplement). To these questions, participants were invited to complete the Beck Depression Inventory⁶ and the Insomnia Severity Index.⁷ The following outcomes were evaluated: postgraduate year; age; workload; nights on call; evolution of stress; consumption of alcohol and tobacco before and during the pandemic and their evolution during the pandemic.

Key Points

Question What were the sleep, mental status, and alcohol and tobacco consumption habits of residents and fellows in otolaryngology before and during the COVID-19 pandemic?

Findings In this cohort study of 128 residents and fellows in otolaryngology in 6 European hospitals, the COVID-19 pandemic was associated with an increase of workload. The increase of workload was associated with a worsening of mental health and sleep outcomes and an increase of alcohol consumption.

Meaning The results of this cohort study suggest that the COVID-19 pandemic and related workload increase may have negative outcomes associated with mental health and sleep and with alcohol consumption of residents and fellows in otolaryngology.

Statistical Analyses

Responses were collected anonymously. Incomplete responses were excluded from analysis. Statistical analyses were performed with the SPSS, version 22.0 (IBM Corp). The following inferential statistical tests were used: Kendall tau, Pearson correlation, χ^2 , Wilcoxon rank sum, and Kruskal-Wallis. The effect size metric was used to describe differences and associations, and 95% CIs were used to describe the precision of the estimates and whether the results were compatible with clinically meaningful associations. Statistical significance was determined by whether the 95% CI crossed 1. Cohen *d* was used to describe effect sizes, with values of 0.2 suggesting a small effect, 0.5 a medium effect, and 0.8 a large effect.⁸

Results

Of 220 potential participants, a total of 128 participants (58.2% [95 residents and 33 fellows]) completed the evaluations. Participant characteristics and workload are presented in **Table 1**. No demographic data on mean (SD) age and sex or gender were collected. The workload of 91% of participants (116 of 128) ranged from 31 to 70 hours per week, and 63% (80 of 127) had more than 3 nights on call monthly.

Mental Health Status

Prepandemic to pandemic mental health and sleep status are reported in **Table 2**. Among participants, 108 (84%) felt that daily life was significantly disrupted by the pandemic, and 73 (57%) felt more stressed at work. At the time of the pandemic, 55 participants (47% of 116 responders) considered themselves as depressed; 22 participants (19%) reported moderate to severe depression. Among the participants with depression, 17 (31%) were fellows and 38 (69%) were residents. The prepandemic prevalence of depression among responders was 40% (*n* = 46), with 17 (37%) being fellows. The prepandemic mean (SD) score of the Beck Depression Inventory (3.1 [2.8]) significantly increased after the start of the pandemic (4.2 [4.1]; difference, -1.1; 95% CI, -1.96 to -0.24; *d* = 0.31).

Sleep Status

At the time of the pandemic, 51 participants (44% of 112 respondents) reported having insomnia, with 17 participants

(15%) having moderate to severe insomnia (Table 2). Among them, 45 (88%) participants were residents and 6 (12%) were fellows. The prepandemic prevalence of insomnia was 18% ($n = 20$), including 3 (15%) and 17 (85%) fellows and residents. The prepandemic mean (SD) score of the Insomnia Severity Index (4.9 [4.1]) significantly increased after the start of the pandemic (6.0 [4.9]; difference, 1.1; 95% CI, 0.00-2.20; $d = 0.25$). Depression was associated with insomnia ($r = 0.5$; 95% CI, 0.4-0.7). The Insomnia Severity Index score was positively associated with years of practice (ie, status) of the residents and fellows ($r = 0.2$; 95% CI, 0.1-0.3).

Alcohol and Tobacco Consumption

Alcohol and tobacco consumption are presented in Table 2. The prepandemic mean (SD) IU of alcohol consumption (1.7 [2.3] IU per week) significantly increased after the start of the pandemic (2.9 [4.0] IU per week; difference, 1.20; 95% CI, 0.40-2.00; $d = 0.37$). Three participants started to drink alcohol after the onset of the pandemic, and no one stopped alcohol consumption.

The alcohol consumption of residents and fellows according to workload is described in eAppendix 2 in the [Supplement](#). The increase of workload was associated with increased alcohol consumption during the pandemic (38% of residents and fellows [3 of 8] who worked 71 hours or more weekly reported an increase of alcohol consumption, and 60% reported no change). The proportion of residents and fellows who reported an increase in alcohol consumption during the pandemic was significantly higher in the group who worked 71 hours or more weekly compared with those working 51 to 70 hours, 30 to 50 hours, and less than 30 hours (eAppendix 2 and eAppendix 3 in the [Supplement](#)). The increase of workload during the pandemic was associated with alcohol consumption (IU per week) and mobilization in COVID-19 units (eAppendix 3 in the [Supplement](#)).

The mean (SD) consumption of tobacco decreased from 2.1 (1.3) to 0.9 (1.5) during the pandemic (difference, -1.20; 95% CI, -1.50 to -0.85; $d = 0.85$) (Table 2). Four participants (4%) smoked marijuana prepandemic and continued during the pandemic. One participant started to smoke marijuana during the pandemic. The amount of alcohol consumed during the pandemic increased for 24 of 117 participants (21%), and the amount of tobacco consumed during the pandemic increased for 8 of the 18 smokers (44%; qualitative question) ([Figure](#)).

Associations Between Workload, Stress, and Sleep Status

The mobilization of residents and fellows in COVID-19 units was associated with an increase of workload ($r = 0.2$; 95% CI, 0.1-0.3) and an increase of stress ($r = 0.2$; 95% CI, 0.1-0.3). There was an association between the years of practice (postgraduate year 1 to fellowship) and increase of the level of stress ($r = 0.2$; 95% CI, 0.1-0.3) and insomnia severity index ($r = 0.2$; 95% CI, 0.1-0.3). The management of treatment in patients with COVID-19 was associated with an increase of tobacco consumption in smokers ($r = 0.4$; 95% CI, 0.2-0.6). The number of IUs of alcohol consumed during the pandemic was associated with the Beck Depression Inventory Score ($r = 0.4$; 95% CI, 0.2-0.6) and the workload (number of hours; $r = 0.3$, 95% CI, 0.1-0.4). The number of glasses of alcohol consumed

Table 1. Characteristics of 128 Participants

Characteristic	No. (%)
Hospital status	
Postgraduate year	
1	27 (21)
2	22 (17)
3	10 (8)
4	26 (20)
5-7	11 (9)
Fellows-in-training	32 (25)
Age range, y	
20-30	87 (68)
31-35	25 (20)
36-45	16 (12)
Workload (h/wk)	
≤30	4 (3)
31-50	55 (43)
51-70	61 (48)
≥71	8 (6)
Nights on call (No./mo)	
None	29 (23)
1-2	18 (14)
3-4	37 (29)
> 4	43 (34)

before the pandemic was associated with the increase of consumption during the pandemic ($r = 0.5$; 95% CI, 0.2-0.6). The consumption of alcohol during the pandemic was associated with the consumption of tobacco ($r = 0.4$; 95% CI, 0.2-0.6).

Discussion

Pandemics may be associated with negative outcomes in the workload, stress, sleep and mental health status of health care workers.^{2,9,10} Residents and fellows in surgical disciplines, such as otolaryngology-head and neck surgery, are particularly at risk regarding demanding, unpredictable workload, high-stakes surgeries, and nights on call.^{2,11}

In this cohort study, we observed significant rates of depression and sleep disorders in residents and fellows, which have increased throughout the pandemic period. Regarding US studies, the prevalence of depression ranged from 5% to 28% of residents in otolaryngology-head and neck surgery,^{3,12} with a 15% increase in depressive symptoms after the start of residency. The proportion of depression found in European residents and fellows is higher than in most US studies.^{2,3} Notably, the prevalence was higher in residents compared with fellows, which was observed in other studies.¹²

It is well known that depressive symptoms may be associated with sleep disturbance, such as insomnia. According to the Insomnia Severity Index, we observed an increase of the insomnia prevalence from 18% to 46% of cases. In 2016, Nida et al¹³ reported a sleep disorder prevalence of 44.5% of residents in otolaryngology, with the severity of sleep disturbance being associated with the workload. In the study of Garcia-Rodriguez et al,¹⁴ the prevalence of sleep disorders reached 58% of US residents and was associated with workload, which is consistent with our observations. The pandemic and the related mobili-

Table 2. Mental Health, Sleep, and Alcohol and Tobacco Use Outcomes

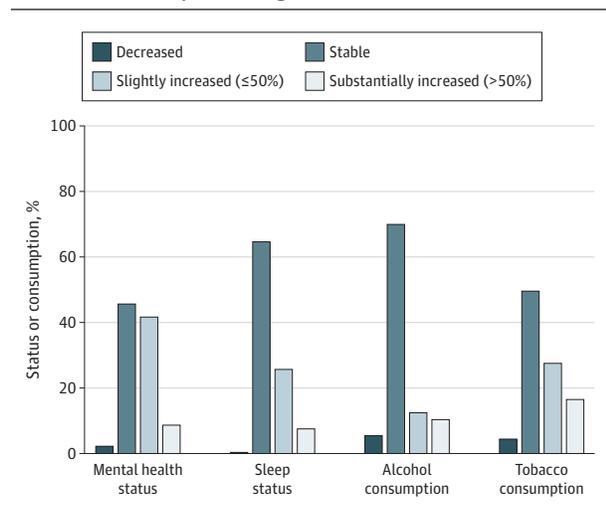
Variable	No. (%)		Cohen <i>d</i>
	Prepandemic	Pandemic	
Beck Depression Inventory, ^a mean (SD)	3.1 (2.8)	4.2 (4.1)	
No depression (<4)	68 (53)	61 (48)	0.31
Mild depression (4-7)	37 (29)	33 (26)	
Moderate depression (8-15)	9 (7)	19 (15)	
Severe depression (>15)	0	3 (2)	
No response	14 (11)	12 (9)	
Insomnia Severity Index, ^b mean (SD)	4.9 (4.1)	6.0 (4.9)	
No insomnia (<8)	91 (71)	61 (48)	0.25
Mild insomnia (8-14)	15 (12)	34 (26)	
Moderate insomnia (15-21)	4 (3)	15 (12)	
Severe insomnia (>21)	1 (1)	2 (2)	
No response	17 (13)	16 (12)	
Alcohol consumption (IU/wk), mean (SD)	1.7 (2.3)	2.9 (4.0)	
No consumption	43 (34)	33 (26)	0.37
≤4	55 (43)	59 (46)	
5-10	11 (8)	20 (16)	
11-20	5 (4)	4 (3)	
>20	1 (1)	1 (1)	
No response	13 (10)	11 (8)	
Tobacco consumption (cigarettes/wk), mean (SD)	2.1 (1.3)	0.9 (1.5)	
No consumption	97 (76)	97 (76)	0.85
≤20	14 (11)	14 (11)	
21-40	3 (2)	1 (1)	
>41	1 (1)	3 (2)	
No response	13 (10)	13 (10)	

Abbreviation: IU, international units.

^a Maximum score is 33.

^b Maximum score is 28.

Figure. Evolution of Sleep and Mental Health Status and Tobacco and Alcohol Consumption During the Pandemic



The amount of alcohol and tobacco consumed during the pandemic increased for 24 participants (19%) and 8 of 18 smokers (44%).

zation of some residents and fellows in COVID-19 units may be considered as an additional risk factor of sleep disturbance.

The increase in workload and the related stress are both factors that may be associated with an increase of substance consumption, such as alcohol and tobacco.¹⁵ In our study, we observed associations between the increase of workload, especially

the mobilization in COVID-19 units, worsening of mental health status, and alcohol consumption during the pandemic, corroborating the findings of a recent study.¹⁵ Thus, in a prospective prepandemic to postpandemic study, Vallée et al¹⁵ observed significant associations between insomnia, depression, and alcohol and tobacco consumption in residents and fellows in general surgery. The evolution of stress and anxiety during the pandemic period was studied by Chou et al¹⁶ in a cohort of 119 US residents in otolaryngology. In this survey, authors reported that 51.3% experienced more stress and 58.8% experienced more anxiety during the pandemic with 10.9% involving burnout. The severity of mental health disorders was associated with more time spent in the hospital, higher surgical volume, and more procedural independence. The mobilization of residents and fellows in COVID-19 units may be another factor associated with the increase of workload, depression, and alcohol consumption. In addition to our observations, Cai et al¹⁷ observed that redeployed residents in COVID-19 departments had greater concern for burnout and reduced in-hospital well-being, supporting the need for more prevention and follow-up of the mental health status of residents and fellows during pandemic periods.

As reported by Shah et al,² the pandemic has exacerbated psychological burdens, morale injury, and distress in young otolaryngologists because of viral exposure risk, resource shortages, and providing care outside their normal practice. Many solutions exist with demonstrated benefits in reducing mental health disorders, including psychological follow-up, space and time to relax in hospitals, individual mindfulness-based stress reduction, and small-group programs to promote com-

munity, connectedness, and meaning.^{2,18,19} More psychological follow-up and space and time to relax in hospitals are points that may improve the mental health of residents and fellows.

Limitations

This study has limitations. The main limitation is the small sample size (6 European university hospitals), which may limit the generalizability of the study findings. Thus, both working environment and related mental health status of residents and fellows from regional and smaller hospitals may be different. Another potential bias is the reluctance of people with burnout or depression to respond to this questionnaire. Survey studies are subject to response bias, especially because reasons for nonparticipation were not available. According to the methods of our survey, we cannot exclude a recall bias because we asked participants to recall pre-pandemic information. To our

knowledge, no previous study assessed the alcohol consumption of residents and fellows and its evolution throughout the pandemic period. The lack of additional postpandemic longitudinal data may be another limitation.

Conclusions

In this cohort study, European residents and fellows reported a high rate of mental health and sleep disorders, which increased during the pandemic period and were associated with an increased risk of alcohol consumption. It is important to share strategies to effectively address the sleep, mental health disorders and related alcohol consumption of residents and fellows through institutional interventions to promote well-being, especially during pandemic periods.

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