

Prevalence and Determinants of Distress Among Residents During COVID Crisis

Pamela Houeiss^{1,2}

¹Laboratory Immunology of Diabetes, Cochin Institute, Department EMD, INSERMU1016, Paris, France

²Medical Faculty, Paris University, Paris, France

*Corresponding author:

Pamela Houeiss,
Laboratory Immunology of Diabetes, Cochin
Institute, Department EMD, INSERMU1016, Paris,
France and Medical Faculty, Paris University, Paris,
France, E-mail: phoueiss@gmail.com

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1. Abstract

1.1. Background and Objectives

Residents are predisposed to develop distress, burnout, and depression. With COVID-19, new stressful working conditions were imposed. This study aims to assess the impact of COVID-19 on residents' wellbeing in France.

1.2. Methods

Residents completed an online survey assessing the sociodemographic characteristics, the workload, the work environment, the burden, and the psychological impact of the pandemic. Wellbeing, burnout, and depression were assessed using respectively the Residents and fellows' wellbeing index (RSWBI), the abbreviated Maslach Burnout Inventory (aMBI) and the PHQ-9 questionnaire. Analysis was done on SPSS 25. Variables were significantly associated with the outcomes if p value ≤ 0.05 .

1.3. Results

Thirty-four residents completed the survey. Their mean age was 28.4 years. Out of the respondents, 20.6% were at high risk for distress, 56% were at moderate to severe risk for burnout and 27% had moderate to severe depressive symptoms. Being single and work overload increased the risk of distress and burnout. Although, COVID-19 did not affect the prevalence of distress and burnout, it increased the intensity of the stress. Residents were concerned about the repercussions that the pandemic might have on their training and on their future. Higher wellbeing index was significantly associated with poorer quality of life ($p=0.001$), higher regrets ($p=0.004$) and lower satisfaction ($p=0.043$) on the professional level.

1.4. Conclusion

COVID-19 had an indirect impact on residents' wellbeing. The interruption of courses, the compromised training and the social isolation contributed to residents' burnout and distress. The remedy would be to create a wellness program that promotes self-care and resilience.

2. Introduction

Physician wellness is a topic of much concern. It is emerging as an important indicator of the quality of medical programs [1]. Wellness as defined by Eckleberry-Hunt and colleagues is "a dynamic and ongoing process involving self-awareness and health choices resulting in a successful balanced lifestyle" [2]. Becoming a physician comes with sacrifices and challenges but it doesn't mean that one needs to suffer during the process. Despite rising the awareness and recognizing the importance of physician wellness, the prevalence of burn out, depression and suicidal ideation is higher among resident physician than the general population³. In fact, residents spend [3-7] years of their lives specializing in a medical field of interest. They are exposed to stressful and traumatic situations that comes with limited control and high responsibilities. They experience pain and death; they have long duty hours, and they are preoccupied by their training and their future while facing their personal insecurities. With these overwhelming stressors and always feeling the need to compete and to be the best, maintaining residents' wellbeing and avoiding burn-out become hard and challenging. The prevalence of burnout among residents in the US varies between 27 and 75% depending on their specialty⁴. The prevalence of burnout in the European countries is around 27.72% (95% CI: 17.4-41.11)⁵. In the US, 28.8% of residents have depressive symptoms⁶. In France, 10% of the residents have suicidal

ideation. Furthermore, the incidence of suicides among residents is 3 times higher than the general population with an incidence of 33 per 1000007. The harmful impact of distress is not limited to residents. It may also affect patient care, and health care systems. The effects include lower physician productivity, increased medical errors, longer recovery time, and lower patient satisfaction. As if all these stressors were not enough, in 2020, Health care professionals (HCP) were facing a new challenge. SARS COV-2 virus (COVID-19) spread, and the world was facing a global pandemic with more than 4 million deaths. Residents were on the frontlines providing care to infected patients. In the light of the uprising crisis, they had to work overtime and stay away from their families. Some were redeployed to other services, while others had their courses cancelled. Studies showed that Covid-19 had an impact on HCP burnout, but few studies checked the effect of the crisis on residents' wellbeing [8,9]. This survey focuses on the prevalence of distress, burnout, and depression among residents in France during the pandemic. It also investigates the impact of COVID-19 related factors on residents' mental health, and it assesses its repercussion on residents' personal, social and professional lives. These data will allow the conception of new strategies in the residency programs to promote wellness and prevent burnout.

3. Materials and Methods

3.1. Study Design

A cross sectional study was conducted among residents in hospitals in France between May and September 2021. An online survey designed in google forms was diffused via email, WhatsApp, and social media to reach as many residents as possible. An abstract on the study and its purpose were provided on the first page of the survey. Residents who filled the questionnaire were assumed to have given their consent to take part in this study. Data was collected anonymously without any potential identifier to protect confidentiality.

3.2. Study Population

Residents were defined as those who are doing a specialty after graduating from medical school. The inclusion criteria were a resident working in a hospital in France during the past year and willing to participate in this study. Any participant who did not fulfill the latter criteria was excluded.

3.3. Study Instruments

An online survey addressed to residents was developed using previously validated instruments. The self-administered questionnaire covered four areas: the socio-demographic characteristics, the work conditions, the impact of COVID-19 and the residents' mental health.

3.4. Primary Outcome

The prevalence of distress, burnout and depression among residents were calculated based the Resident/Fellow Well-Being Index

(RSWBI), the abbreviated Maslach Burnout Inventory (aMBI) and the Patient Health Questionnaire (PHQ-9) respectively. A- Wellbeing: The survey utilized the RSWBI, a Mayo clinic validated 7 yes/no questions tool to assess residents' wellbeing [10]. The scores range from 0 to 7. Based on a national survey, the mean score is 2.53 and the median is 2. Residents with a score of 5 or more are in distress and are at higher risk for depression, burnout, and suicide. B- Burnout: Burnout was assessed with the use of the modified a MBI [11,12]. It uses a three-item screening questions for each of the three dimensions: emotional exhaustion (EE), depersonalization (DP), and personal achievement (PA). Each question uses a 7 item Likert scale, and scores go from 0 (never) to 6 (always). Each component of burnout scores from 0 to 18. A score above 9 on EE or DP means that residents have moderate to severe emotional exhaustion and depersonalization. Whereas if they score 0-9 on PA, they have a low sense of personal achievement. Residents are considered to have burnout when they have one abnormal score in these subscales. C- Depression: The severity of depression was assessed using the validated PHQ-9[13]. The score can go from 0 to 27 with each item being attributed a number from 0 to 3 depending on the frequency of occurrence of the described symptom. A cutoff of ≥ 5 identify the presence of any depression related symptom and a cut-off of ≥ 10 identify a moderate to severe depression.

3.5. Secondary Outcome

The association between the study variables and wellbeing, burnout and depression scores were tested to identify possible risk factors. The repercussion of the residents' wellness status on the different aspects in life were assessed.

A- Sociodemographic characteristics: data on the age, the gender, the nationality, the household status, and the marital status were collected. B- Workload: Residents were asked about their weekly schedule and about having extracurricular activities. Sleep deprivation was defined as residents sleeping less than 7 hours per day. The Workload score was based on working hours (overtime, working more than 60 hours/week, duty hours/ week), on work intensity score, on sleeping hours and on the interactions with patients. One point was attributed to each item except for the work intensity score in which 1 point was attributed for the values [6-7], and 2 points were attributed to the values [8] and above. C- Work environment: To assess the work environment, 5-point Likert scale questions on teamwork, level of communication and the amount of contribution to decision making were used. Also, mistreatment was assessed by reporting the frequency of exposure to any type of discrimination during this year of residency. Residents were classified by the maximum reported frequency of any of the mistreatment exposure into no exposure, exposure a few times/year and exposure few times/ month¹⁴. The validated mayo clinic leadership behavior score was also used. Each item in this score has a 5 point-Likert scale to assess the behavior of the residents' super-

visors during their rotations¹⁵. The score ranges from 0 to 32 with the highest score indicating better leadership skills. D- Working conditions during COVID-19: To assess the residents' experience with COVID-19, questions on their exposure to sick patients, on their fear and readiness to face this pandemic, on the availability of protective equipment and on the support provided by the hospital were asked. Also, the repercussion of COVID-19 on the residents' training, courses, financial status, health, and social life was evaluated. E- Stressors and coping strategies: Residents were requested to grade from 0 to 100, the stress level before and during COVID-19. Multiple choice questions on the factors contributing to their mental stress and on their coping behaviors were asked. F- Repercussion on residents' lives: Residents were asked if they had any suicidal ideas in the past year¹⁶. They were also asked simple yes/no questions to check if they abused alcohol, tobacco, drugs, or medications during the past year. The validated one-item 7-point Likert type scale was used to assess the residents' quality of life (QoL-1) [17]. The score ranges from 1 (low or negative) to 7 (high or positive). Residents with scores below 4 had a low quality of life. Those with a score of 4 had an average QOL and those with scores above 4 had a good quality of life. A 5-point Likert scale was used to assess the level of satisfaction in their residency program, in their carrier choice and in their work life balance. It went from very unsatisfied to very satisfied. Residents were allowed to express freely any other opinion related to their wellbeing.

3.6. Statistical Analysis

Data analysis was done using the Statistical Package for Social Sciences (SPSS) version 25 (IBM, USA). Sociodemographic characteristics of the study population were determined using descriptive statistics. Results of descriptive statistics were reported using mean \pm standard deviation (SD) for the continuous variables and frequency or percent for the categorical values. The endpoint variables (wellbeing, burnout, and depression) were the dependent variables. Each endpoint was computed into a continuous and a categorical variable as described earlier. The association between the dependent and the independent variables was evaluated using independent T test, one-way ANOVA or Pearson correlation when the sample's size allowed it and with the non-parametric Kruskal Wallis, Mann Whitney U and spearman correlation tests when $N < 30$. The Chi square and the Fischer exact test were used to assess the association between two categorical variables. A significant p value was set at 0.05. At first, the prevalence of distress, burnout, and depression among participants was assessed. The mean and median of RSWBI were compared to the values from the general population using respectively the one sample T test and the one sample Wilcoxon signed rank test. The baseline characteristics and the working conditions of residents and their association with the endpoints were checked. I only show the results using continuous dependent variables. In the second part, a univariate analysis studies the COVID related working conditions and their

association with wellbeing, burnout, depression and stress difference. The third analysis focused on the stressors and coping technique adopted by the participants during the pandemic. The last one showed the repercussion of the three endpoints on the quality of life, on the presence of suicidal ideation, on the development of abusive behavior and on the level of satisfaction among residents. A multivariate analysis was planned but was not feasible due to the low number of participants.

4. Results

4.1. Baseline Characteristics and General Working Conditions

Despite reaching out to many hospitals, only 34 residents completed the survey. The response rate couldn't be estimated since we don't know the exact number of residents that got the link of the questionnaire. Most respondents were females and were originally from France. Their mean age was 28.4 years. Of the respondents, 59% were in a relationship, 61.8% were sharing their apartments with a family member, a partner, or a roommate and 14.7% had kids (Table1). Participants were mainly working in hospitals located in Paris and its suburbs with only 15.1% working in Lyon or Bordeaux (supp Figure 1). The majority were in post-graduate year 3 (84.8%) (supp Figure 2). 69.7% were specializing in non-surgical specialties (supp Figure 3). In their last rotation, residents were equally assigned to a surgical or a medical service within which 65% admitted critical patients. On average, they were taking care of 28 patients/week. Around 38% of residents claimed to have a limited interaction with their patients. Among the participants, 44% were working more than 60 hours per week, 50% were sleeping less than 7 hours/ day, 70% had to take courses and 35% had to participate in lab research in addition to their usual tasks. When asked about the frequency of working overtime, almost 41% of residents answered frequently or every day. When asked about work intensity on a scale from 0 to 10, 41% attributed a score of 8 or more (supp Figure 5). When it comes to the work environment 80% of the residents reported having a good dynamic within the team and 70% reported a possibility to assist in decision making (supp Figure 6). 30% were subject to discriminations based on gender, on race, on pregnancy status and/or on origin. The nature of the abuse was either verbal (60%) and/or emotional (40%) and/or sexual (30%) (Table1). The residents were also asked to assess the leadership skills of their supervisor. Around 50% agreed that their supervisor held career development conversations with them, recognized them for a job well done and took the time to inform them about the changes occurring in the division. Around 65% agreed that their supervisor encouraged them to do their job and gain experience and provide them with helpful feedback. 82% agreed that the supervisor respected them and treated them with dignity (Supp Figure 7). Prevalence of distress, burnout, and depression during COVID-19 crisis. The average wellness index score in all participants was 3 (SD=1.7) with 20.6% being at greater risk to have a distress related personal or professional consequence. The

median of RSWBI during COVID- 19 was significantly higher than the norm (Median: 3 v/s 2, $p=0.003$) (supp Figure 10). Using the aMBI score (supp Figure 11-12) to assess the risk of burnout, 35.3% of residents were having a moderate to severe emotional exhaustion, 29.4% had low sense of personal accomplishment and 11.8% had moderate to severe depersonalization (Figure 1B). In total, 56% of residents were at risk for burnout. The higher risk of burnout correlated best with EE ($r=0.841$, $p<0.001$) followed by DP ($r=0.739$, $p<0.001$) and PA ($r=0.56$, $p=0.001$). The risk of depression among residents was evaluated with the PHQ9 score. 70% of participant had depressive symptoms with 6% having severe symptoms and requiring further assessment (Fig 1C). Of the 85% who had an issue with at least one item in the PHQ9, 62% acknowledge a repercussion on their tasks at work and at home and on their social life (supp Figure 8). Wellbeing index correlated significantly with PHQ9 score ($r=0.62$, $p<0.001$) and burnout ($r=0.546$, $p=0.001$). Figure 1A shows the distribution of the answers for each measured item in the wellbeing index. COVID independent factors affecting residents' wellbeing Age, gender, and nationality had no significant effect on wellbeing. Being in a relationship rather than single decreased the risk of distress (OR= [0.007-0.681]), burnout, and depression with $p <0.05$). Having a

partner was associated with higher sense of personal accomplishment as compared to not having one (mean PA score=12.9 v/s 9.9, $p=0.02$). Similar results were observed when comparing residents' living arrangement; those who lived with their family or their partner or a roommate had a lower risk of being in distress, they were less emotionally exhausted and depersonalized, and they had higher sense of accomplishment thus lower risk of burnout and depression ($p<0.05$). Having kids tends to increase the sense of accomplishment (mean PA score: 14.4 v/s 11.2, $p=0.08$) and to protect the residents from depersonalization and burnout (mean DP score: 2.4 v/s 4.1 $p=0.36$ and mean aMBI=13.8 v/s 19.5 $p=0.17$). The level of training and the specialty were not significantly associated with increased distress, despite data showing that surgery residents and newly comers are more predisposed to experience burnout. Rotating in surgical services increased the risk of burnout ($p=0.03$) with 2 times higher risk of depersonalization ($p=0.03$). The determinants of the work environment did not show any correlation to the residents' wellbeing. However, the composite variable of the workload showed that the higher the workload, the higher is the risk of distress ($r=0.44$, $p=0.009$) and emotional exhaustion ($r=0.37$, $p=0.03$). These results are shown in Table 1.

Table 1: Baseline Characteristics of the resident physicians and their association with RSWBI, aMBI (EE, DP, PA) and PHQ9

	All participants % (N) or mean (SD)	Residents with Wellness score ≥ 5 % (N)	Average wellness index Mean (SD)/R	EE Mean (SD)/R	DP Mean (SD)/R	PA Mean (SD)/R	aMBI Mean (SD)/R	PHQ9 score Mean (SD)/R
Total	N=34	N=7	3(1.7)	8.5(4.3)	3.8(3.6)	11.7(3.8)	18.6(8.5)	6.9(4.5)
Age Mean (SD)	28.4(2.9)	28.3(3.2)	$r=0.01$	$r=0.21$	$r=0.07$	$r=0.11$	$r=0.09$	$r=0.27$
Gender								
Men	29.4(10)	42.9(3)	2.9(1.8)	8.5(3.8)	5.5(4.2)	12.4(3.9)	19.6(7.2)	6.7(4.2)
Woman	70.6(24)	57.1(4)	3.1(1.7)	8.5(4.6)	3.1(3.2)	11.4(3.8)	18.2(9.1)	6.9(4.6)
Nationality								
French	67.6(23)	71.4(5)	2.9(1.8)	8(4.3)	3.9(3.7)	12(3.5)	17.9(8.6)	6.5(4.3)
Other	32.4(11)	28.6(2)	3.2(1.5)	9.6(4.3)	3.6(3.7)	11(4.5)	20.3(8.2)	7.5(4.9)
Marital Status								
Single	41.2 (14)	85.7(6)*	3.8(1.7)*	9.8(4.1)	4.4(4.2)	9.9(3.9)*	22.3(8.1)*	8.7(4.5)*
Married/Couple	58.8(20)	14.3(1)	2.4(1.5)	7.6(4.3)	3.3(3.2)	12.9(3.3)	16.1(7.9)	5.5(4.1)
Kids								
Yes	14.7(5)	14.3(1)	3.2(1.9)	7.8(4.6)	2.4(2.5)	14.4(4.8)	13.8(6.7)	7.8(5.9)
No	85.3(29)	85.7(6)	3(1.7)	8.6(4.3)	4.1(3.8)	11.2(3.5)	19.5(8.5)	6.7(4.3)
Living arrangement								
Alone	38.2(13)	71.4(5)	3.8(1.7)*	10.7(3.9)*	5.6(4.4)*	9.3(3.2)**	25(6.4)**	8.7(4.8)
With partner/family/ roommate	61.8(21)	28.6(2)	2.5(1.6)	7.2(4.1)	2.7(2.6)	13.1(3.5)	14.7(7.1)	5.7(3.9)
Level of training (N=33)								
≤ 2 years	15.2(5)	42.9(3)	4.2(2.6)	10.6(4.8)	5.2(5.2)	10.8(4.8)	23(11.3)	9.6(5.2)
>2 years	84.8(28)	57.1(4)	2.8(1.5)	8.4(4)	3.7(3.4)	11.6(3.6)	18.5(7.4)	6.5(4.2)
Specialty (N=33)								
Medical	69.7(23)	66.7(4)	2.8(1.6)	8.1(4)	3.3(3.2)	12.6(3.7)	16.9(8.3)	6.4(4.1)
Surgical	30.3(10)	33.3(2)	3.2(2)	9.5(5.2)	4.7(4.7)	10.2(3.3)	22(8.3)	7.5(5.3)
Current rotation (N=32)								
Medical	53.1(17)	57.1(4)	3.1(1.6)	7.9(4.2)	2.5(3.3)*	12.9(4)	15.5(7.9)*	6.3(4.4)
Surgical	46.9(15)	42.9(3)	2.9(2)	9.2(4.8)	5.4(3.7)	10.6(3.3)	22(8.4)	8(4.5)
Composite Workload score^a (0-8)	3.7(2)	5.4(2.1)**	R=0.44**	R=0.37*	R=0.13	R=0.11	R=0.13	R=0.17

Work environment									
Team dynamics index (0-12)^b	9.6(1.7)	9.4(1.9)	R=-0.08	R=-0.28	R=-0.14	R=0.22	R=-0.31	R=-0.25	
Leadership index (0-32)	18.7(5.4)	17.4(8.4)	R=-0.11	R=-0.183	R=-0.21	R=0.09	R=-0.22	R=-0.03	
Discrimination									
No	70.6(24)	71.4(5)	3(1.5)	8.3(3.9)	3.5(3.5)	11.9(3.8)	17.9(8.1)	6.7(4.1)	
Few times/year	26.5(9)	28.6(2)	3(2.4)	9.4(5.4)	4.7(4.3)	11.9(3.5)	20.2(10.3)	7.1(5.8)	
Few times/month	2.9(1)	0(0)	3(0)	5(0)	3(0)	5(0)	21(0)	8(0)	

^aworkload score is the sum of sleeping hours, working hours, duty hours, work intensity, working overtime and interaction.

^bTeam dynamics index is the sum of the 3 variables: communication and coordination, decision making and getting along with the team. *if 0.001 < p value < 0.05, ** if p value <= 0.001

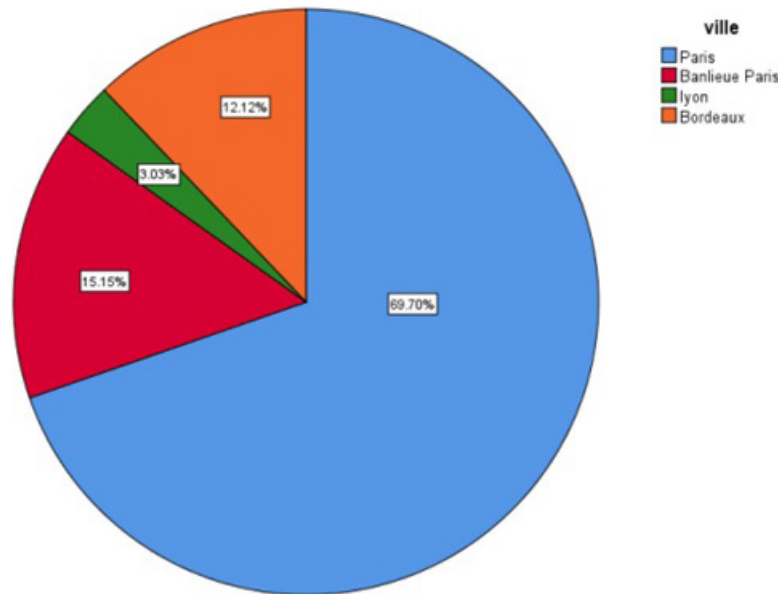


Figure 1: Classification of residents by place of residence

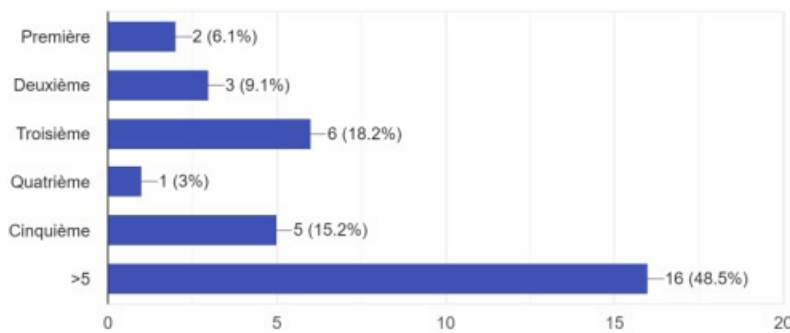


Figure 2: Classification of respondents by residency year

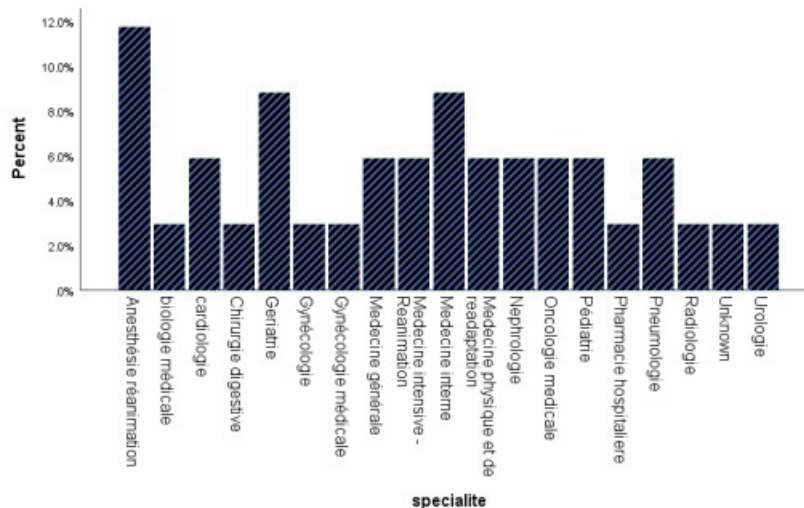


Figure 3: Classification of respondents by their specialty

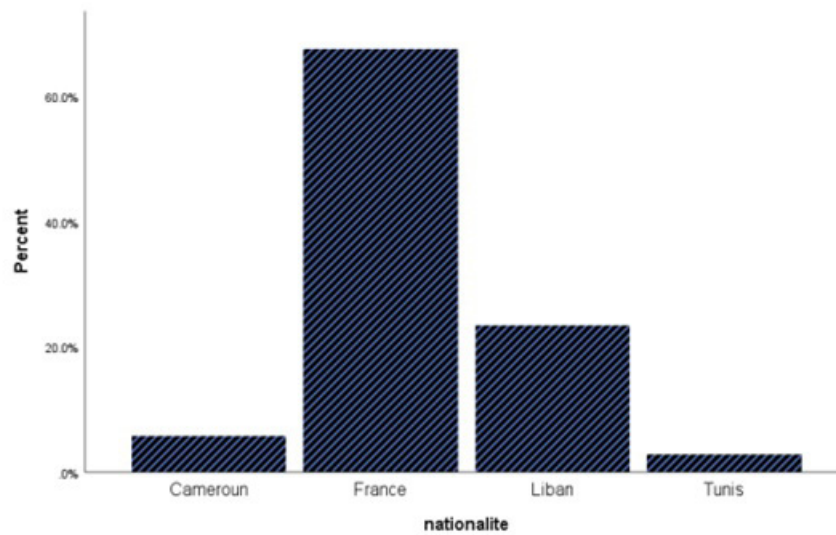


Figure 4: classification of residents by nationality

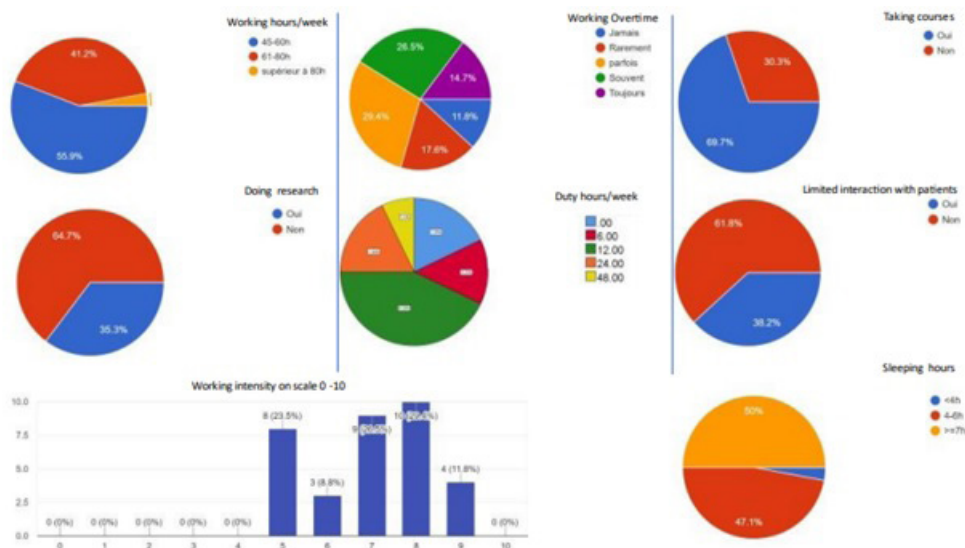


Figure 5: Workload among residents

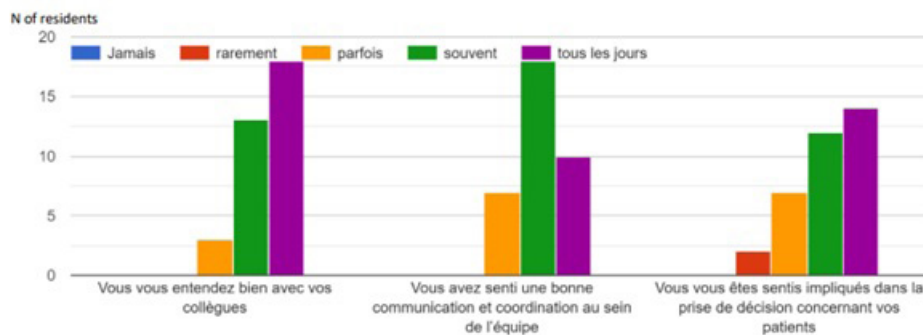


Figure 6: Team dynamics during residents' last rotation

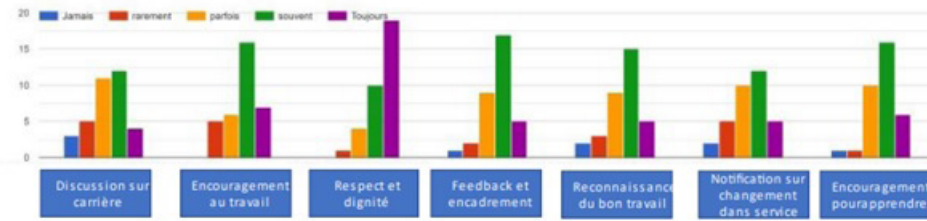


Figure 7: Residents' responses to leadership items

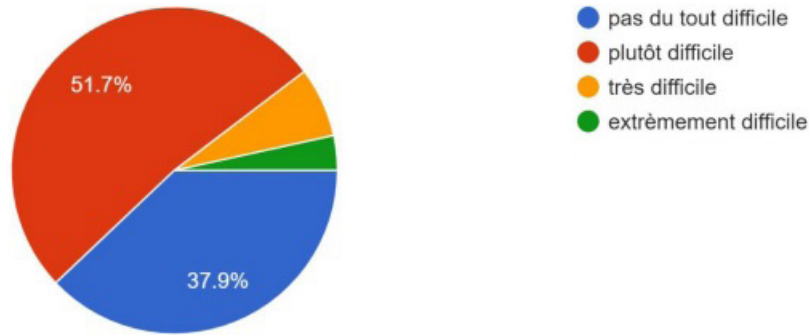


Figure 8: Repercussion of depression on daily activity

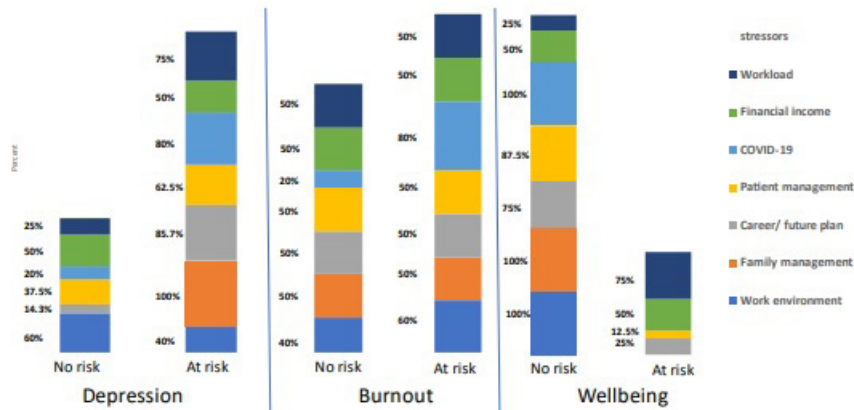


Figure 9: Distribution of stressors by mental health status

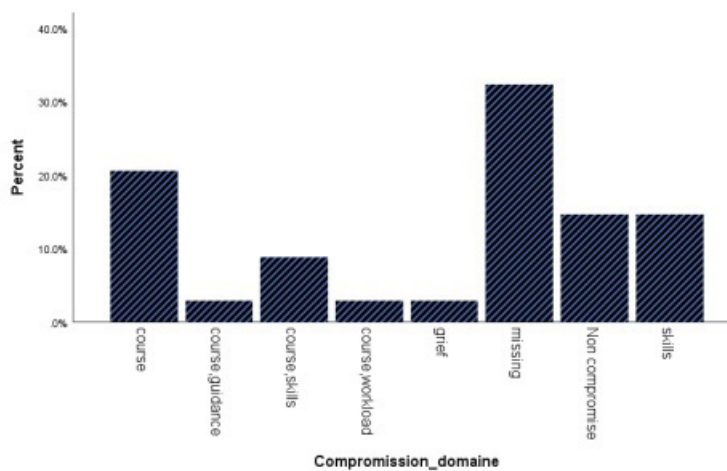


Figure 10: Compromised elements in training during COVID-19

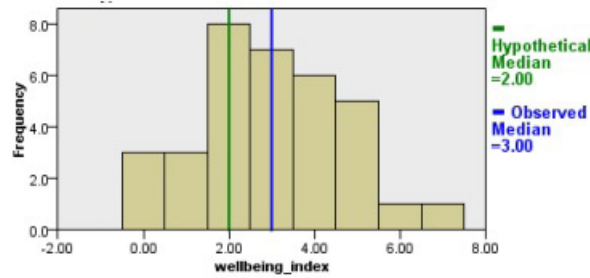


Figure 11: Differences in the medians before and during COVID using the One sample Wilcoxon signed rank test

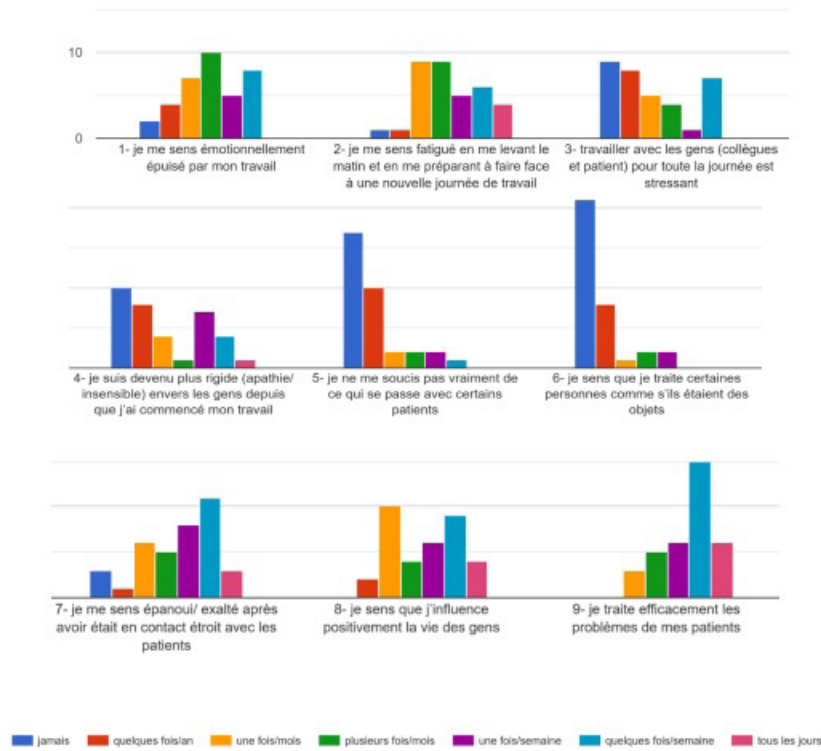


Figure 12: Residents' responses to aMBI per item

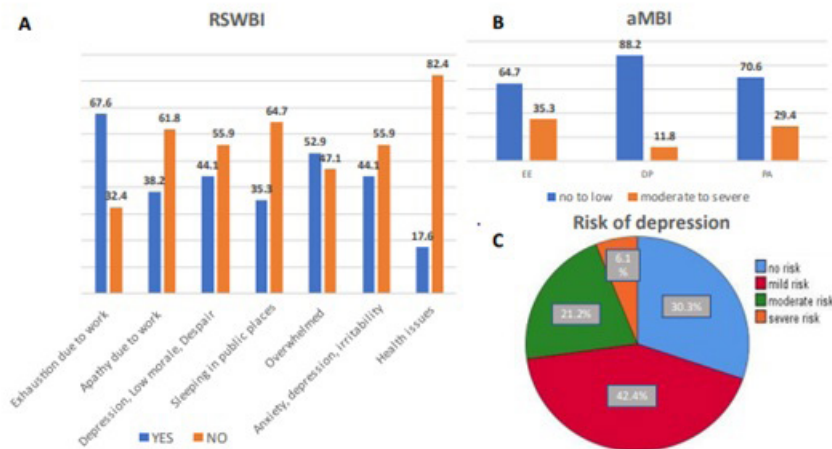


Figure 1: Prevalence of distress, burnout, and depression during COVID_19. A-Wellbeing index responses to each item by resident physicians during the COVID-19 pandemic. B- Severity of the symptoms of the 3 dimensions in the abbreviated MBI. C- Depressive symptoms classification as per the PHQ9 questionnaire. (EE= emotional exhaustion, DP= depersonalization, PA= personal achievement, MBI=Maslach Burnout inventory).

5. COVID Direct Effect on Residents

Among participants, 88.2% took care of COVID-19 patients mainly inpatients on regular floors and in the ICU, for an average period of 6 months. 43.3% were involved in treating these patients during the 3 waves. 73.3% worked with infected patients during the third wave. They were seeing on average 6 patients/day. Table 2 describes in detail the personal, emotional, and professional situation of residents during COVID-19. These COVID related variables had no significant effect on residents' wellbeing, burnout, or depression (supp Figure 15). However, the RSWBI was the highest in those who did not manage COVID patients and those who treated COVID positive patients for at least 2 waves including the third wave. The lowest score was seen in those who only worked during the last wave (Figure 3A). Reversed variations were seen with burnout (Figure 3B). During the crisis, residents were more stressed. ($r=0.43$ $p<0.001$). The mean stress intensity increased from 52.2(SD=23.9) before COVID-19 to 70.7 (SD=22.1) during

COVID-19 (Figure 2A). The fear from acquiring the disease and the change in workload were significantly associated with the increase in stress (Mean increase (fear/no fear) 27.3 v/s 5.3 $p=0.029$ and Median 15 v/s 5 $p=0.037$) (Figure 2B-C). In residents' opinion, the most important stressors during the past year were taking care of patients (23.5%) and planning the future (23.5%). Only 14.7% chose COVID-19 as a major source of stress (Figure 4A). It was a common stressor among residents at risk for burnout, whereas the other two stressors were common among residents at risk for depression or distress (supp Figure 9). Most residents (76.9%) felt that their education and training were compromised by the crisis in many aspects (Table 2). Explicitly, residents were concerned about missing training, losing educational opportunities, and lacking professional development which might affect their future. Some were also frustrated about not having the time to grieve (supp Figure 10). Talking to family and colleagues was the most common strategy adapted by residents to deal with the stressors (Figure 4B).

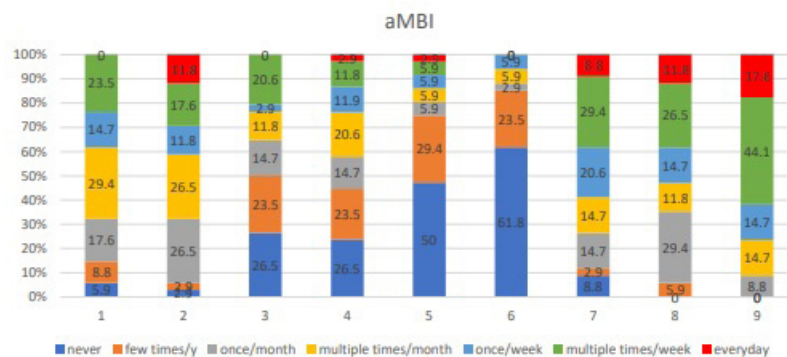


Figure 13: Summary of aMBI answers

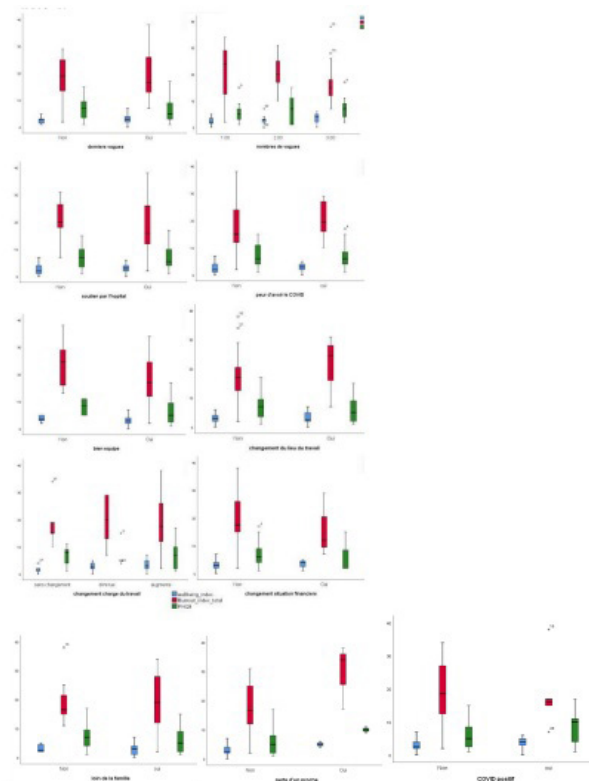


Figure 14: Wellbeing, burnout, and depression scores variations with the COVID related Factors

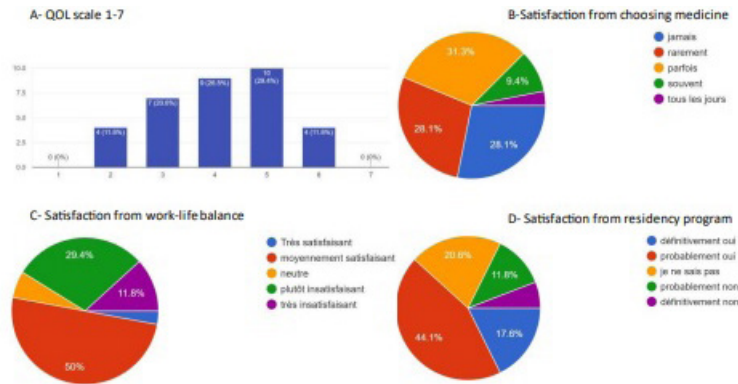


Figure 15: Quality of life and satisfaction

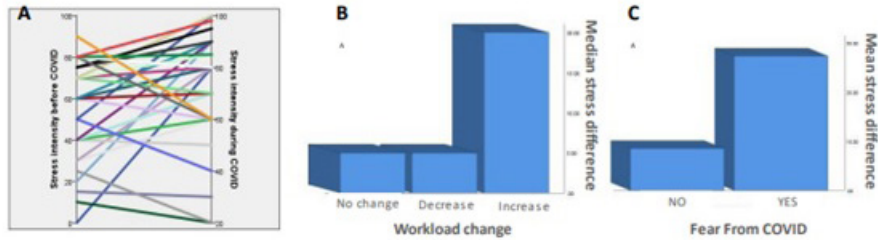


Figure 2: COVID-19 effect on stress intensity. A-Intensity of stress increases during COVID-19. B- The increase in workload due to COVID-19 increases the stress intensity. C- The fear from acquiring COVID-19 increases the stress intensity.

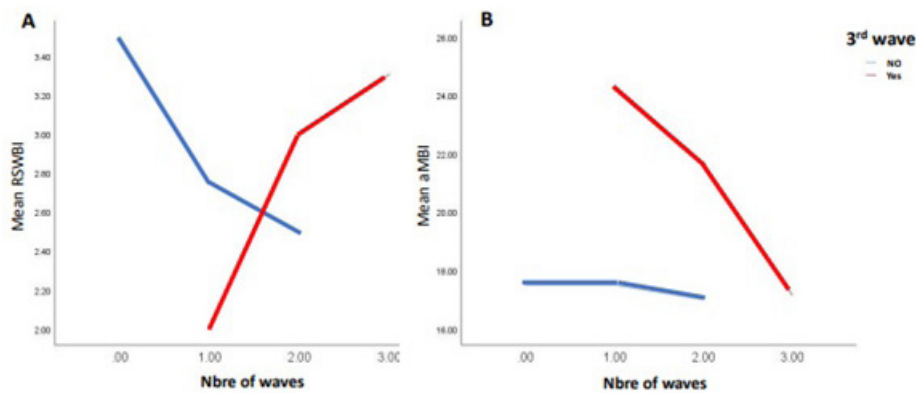


Figure 3: Changes in Wellbeing and burnout status with the exposure to COVID positive patients. Graphs showing the variation of the wellbeing index (A) and of the Burnout index (B) with the amount of exposure to COVID positive patients (Number of waves) and the freshness of the exposure (exposure to third wave). Results are presented by the mean RSWBI or the mean aBMI for each category.

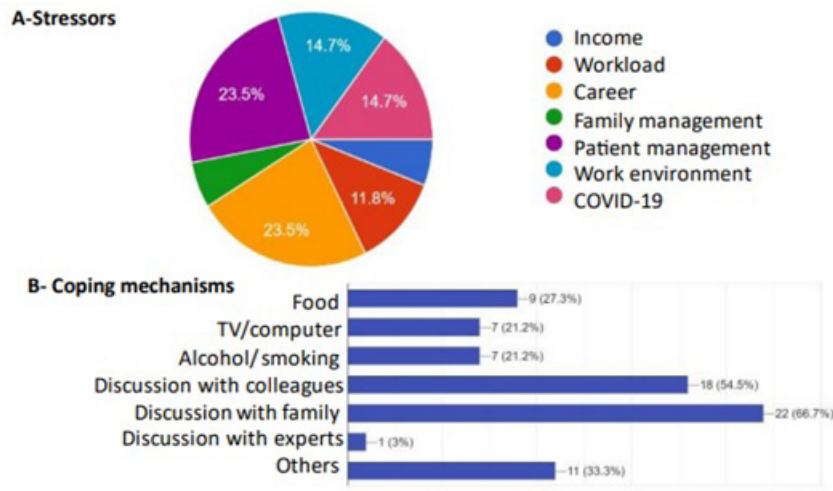


Figure 4: Stressors and coping mechanisms during COVID-19. A-Repertition of stressors among the residents during COVID-19. B- coping mechanisms responses by residents during COVID-19.

Table 2: Residents' working conditions during COVID-19

	ALL PARTICIPANTS %(N)
TREATING COVID PATIENTS (N=34)	
YES	88.2(30)
NO	11.8(4)
IF YES	
WAVES (N=30)	
FIRST	73.3(22)
SECOND	73.3(22)
THIRD	73.3(22)
LAST WAVE (N=30)	
YES	73.3(22)
NO	26.7(8)
DURATION IN MONTHS MEAN (SD) N=19	5.9(4.7)
UNITS (N=29)	
OUTPATIENT	17.2(5)
EMERGENCY DEPARTMENT	24.1(7)
OR	6.9(2)
INPATIENTS FLOOR	55.2(16)
INTENSIVE CARE	41.4(12)
LABORATORY	3.4(1)
NUMBER OF PATIENTS/DAY MEAN (SD) N=19	5.7(4.5)
	All participants
LOSS OF A FAMILY MEMBER(N=34)	
YES	20.6(7)
NO	79.4(27)
AWAY FROM FAMILY(N=34)	
YES	73.5(25)
NO	26.5(9)
CAUGHT COVID(N=34)	
YES	17.6(6)
NO	82.4(28)
READINESS TO FACE THE CRISIS MEAN (SD) N=32	5(2.8)
FEAR OF HAVING COVID (N=34)	
YES	50(17)
NO	50(17)
PROTECTIVE EQUIPMENT (N=34)	
YES	82.4(28)
NO	17.6(6)
SUPPORT IN THE HOSPITAL(N=34)	
YES	79.4(27)
NO	20.6(7)
CHANGES IN PROFESSIONAL ACTIVITY (N=34)	
YES	85.3(29)
NO	14.7(5)
COMPROMISED EDUCATION (N=26)	
YES	76.9(20)
NO	23.1(6)
DEPLOYMENT(N=34)	
YES	67.6(23)
NO	32.4(11)
CHANGE IN WORKLOAD(N=34)	
NO	20.6(7)
INCREASED	58.8(20)
DECREASED	20.6(7)
CHANGE IN FINANCIAL SITUATION (N=34)	
YES	14.7(5)
NO	85.3(29)

5.1. The Repercussion of Residents' Wellness During COVID Crisis on Their Lives.

Being in distress can affect many dimensions in life. On a psychological level, 8.8% of respondents had suicidal ideation at least once during the last year. 29.4% of residents managed their distress by the substance abuse mainly alcohol and smoking (supp Figure 16). These psychological disorders were not significantly

associated with neither the RSWBI, nor the aMBI, nor the PHQ9 score (data not shown). On a personal level, 41.2% of the residents described their quality of life by being good, whereas 32.4% saw that their life was somewhat distressing (supp Figure 15A). The quality-of-life scale was inversely correlated to the wellbeing index ($r=-0.53$, $p=0.001$) (Figure 5B). Any worsening emotional exhaustion, any increase in the risk of burnout and any increase

in the risk of depression were significantly correlated to a poorer QOL ($r(EE)=-0.41, p=0.02, r(aMBI)=-0.41, p=0.02, r(PHQ9)=-0.65, p<0.001$). On a professional level, almost half of the participants regret at least sometimes their choice to pursue a degree in medicine (supp Figure 15B). Residents with regret have a higher aMBI index ($r=0.49, p=0.004$) and a higher level of emotional exhaustion ($r=0.55, p=0.001$) (Fig 5D). On another level, all residents were not satisfied with their residency program, 17.7% were disappointed with their training and 20.6% were undecided (supp Figure 15D). The level of satisfaction of the residency program is significantly associated with the wellbeing index ($r=-0.49,$

$p=0.003$), with the risk of burnout ($r=-0.52, p=0.002$) mainly with EE ($r=-0.48, p=0.004$) and PA ($r=0.45, p=0.008$) and with the risk of depression ($r=-0.55, p=0.001$) (Figure 5C). On a social level, almost half the residents (41.2%) acknowledge that they couldn't maintain a work-life balance during the last year in training (supp Figure 15C). The lack of work life balance is significantly associated with a high RSWBI ($r=-0.47, p=0.005$), a high aMBI ($r=-0.48, p=0.004$), a high PHQ9 ($r=-0.62, p<0.001$), a high EE score ($r=-0.37, p=0.032$) and a Low PA score ($r=0.42, p=0.013$) (Figure 5E).

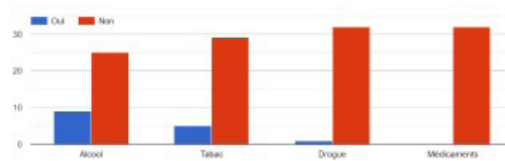


Figure 16: Substance abuse among residents

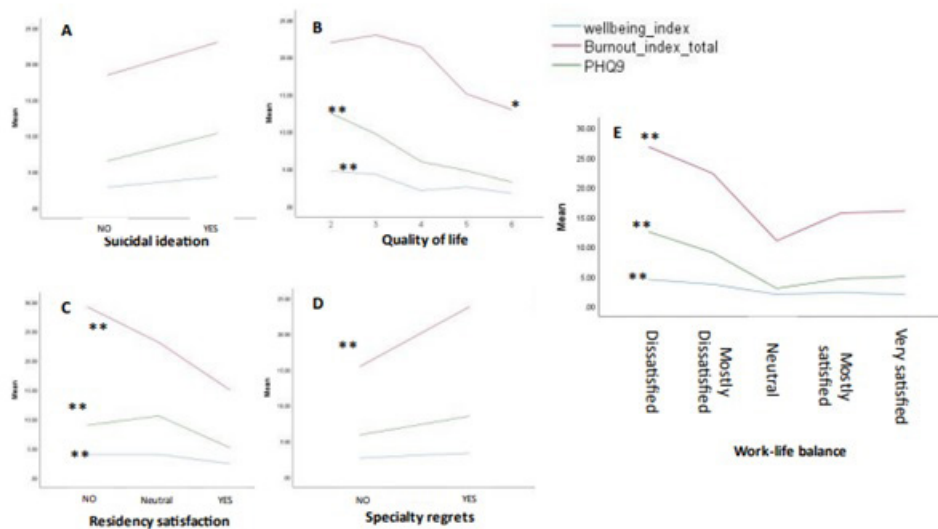


Figure 5: Repercussion of residents' wellness status on mental health, quality of life and satisfaction. A Variations of indexes in the presence of suicidal ideation. B- Quality of life inversely correlates with wellbeing, depression, and burnout (1 to 6 with 6 being perfect). C- Residents are satisfied with their residency program with a lower risk of distress, depression, and burnout. D- Residents shows more regrets with their choice when they are at risk of burnout. E- The better the work life balance, the lower the risk of depression, burnout, and distress. *if $0.001 < p \text{ value} < 0.05$, ** if $p \text{ value} \leq 0.001$

6. Discussion

This survey of 34 residents revealed that during COVID-19, the respondents are at a higher risk of distress regardless of the exposure to COVID positive patients. The workload and the family status affected the residents' wellbeing. From the COVID-19 related factors, none was significantly associated to the wellbeing, burnout, and depression scores. However, fear from getting the disease and the increased workload were associated with an increased stress. During the crisis, residents were mainly concerned about the interruption of the educational activities and the repercussion of the whole situation on their future career. The distress put them at risk for substance abuse, it compromised their quality of life

and the level of satisfaction of the work-life balance. Impact of COVID on the prevalence of Wellbeing, Burnout, and depression. During the crisis, residents scored higher on the wellbeing index. It is difficult to compare the values observed in this study to the ones from other studies due to the heterogeneity of the used indexes. However, similar mean RSWBI values and higher at-risk percentages were observed in a study conducted during COVID-19 among US residents when using the same index (mean=2.84±2.04, at-risk=24%)¹⁸. The report of 2020-2021 from Mayo clinic showed that out of the 9,164 assessed residents and fellows from the world, 16.4% were at high risk for distress. The differences in at risk percentages can be explained by the regional variation

of medical programs and COVID-19 burden. Burnout is one of the dimensions in wellbeing; it correlates with wellbeing without being similar. Despite the previous study showing increased residents' burnout during the pandemic, the prevalence of burnout in this study was unchanged. The calculated frequency is in the range of values obtained from other studies before and during COVID-19, 19, 20. Nevertheless, COVID-19 did influence the burnout dimensions. During the pandemic, residents mostly experienced high emotional exhaustion. This was not the case before COVID-19. Results from the national Bourbon study showed that junior residents report high prevalence of depersonalization (30-38%) and of low personal accomplishment (29-42%) and lower prevalence of emotional exhaustion (12-29%)²¹. This is consistent with a study on medical and surgical residents showing that 50% have severe loss of empathy²². During COVID-19, residents worked under pressure which might explain the high emotional exhaustion. However, working during this crisis could have been rewarding. Actively helping patients to recover and to rejoin their family could have increased the sense of accomplishment. Wellbeing also correlates with depression. In this study, physicians in training were at a higher risk for depression. Before the pandemic, a systematic review showed that the prevalence of moderate to severe depressive symptoms was 20.9%⁶. This prevalence increased to 27% during COVID-19. Residents were in a situation where they must face death and fear on daily basis while being isolated from their support system. During COVID-19, HCP in India including residents were having similar issues²³.

6.1. Risk Factors for Distress, Burnout, and Depression

During a pandemic, Health care workers are prone to develop distress reactions, psychiatric disorders and health risk behaviors as opposed to becoming resilient [24]. This is secondary to the pre-event, the event, and the post-event risk factors. In this study, when looking into the pre-event risk factors, it was shown that residents rotating in surgery are at higher risk for burnout manifesting as depersonalization. Work overload exposed residents to emotional exhaustion leading to distress. Additionally, work environment was not always optimal, many residents were not having their supervisor's guidance and encouragement to ease their stress and to improve their skills. On a different level, having family support and not living alone protected the residents by increasing the sense of accomplishment and limiting depersonalization, and therefore burnout. The current literature showed that besides autonomy and competence building, strong social support is associated with residents' wellbeing [3]. These observations are concordant to the results from studies on the risk factors of burnout among residents [3,25]. In a disaster, the duration and the severity of exposure can affect the psychological outcome²⁶. During the crisis, COVID-19 was not the most important contributor to distress and burnout. Although a study done on residents showed that the greater exposure to patients with COVID-19 and the access to adequate protec-

tive equipment predict burnout [19], none of these factors correlated with wellbeing and burnout in this study. It is possible that the limited number of participants, the difference in the exposure's severity per specialty [27] and the different timing in exposure diluted the impact of COVID-19 on residents' wellbeing. When classifying Wellbeing and burnout indexes by the number of waves and by being actively involved in treating patients during the last wave, a discordance was seen between the groups. Residents who didn't treat COVID-19 patients or those who treated patients during the 3 waves had a low burnout index compared to those who worked with COVID-19 patients for the first time during the last wave. On the other hand, these observations were reversed when checking the distress levels. Burnout and wellbeing variables correlate, but they are not equivalent. By treating patients during 3 waves, residents were more autonomous and more confident when handling these patients. Additionally, the advances in the understanding of the disease, the development of the vaccines for prevention and the decline in the incidence of severe cases alleviated the disease's burden. Being actively engaged during the crisis induced a sense of fulfillment. Nevertheless, this doesn't mean that residents were not suffering. Someone said: "in a disaster, the size of psychological footprint greatly exceeds the size of the medical footprint"²⁸. Those who worked this long with COVID-19 patients did not have the time to grieve, to reflect, to process and to rebuild. On the other hand, residents who never worked with COVID-19 patients were not at risk for burnout, but they did suffer from the course's cancellation and from the social isolation. Also, they didn't take part in fighting the pandemic and they didn't experience the fulfillment from saving lives. These observations were also found by Dimitriu et al; residents who were involved in treating COVID-19 patients had less burnout than those who were not [29]. During COVID-19, the intensity of stress increased, and it correlated with burnout and wellbeing. Residents worried most about managing the patients. On one hand, they were afraid from acquiring COVID-19 and on the other hand, they worked in saturated services while lacking evidence on the management of COVID-19. Residents were also preoccupied by their career. They felt that their education and their training were compromised and that this would affect their skills in the future. Stressing over the disease per se came second. Residents expressed their concerns about their readiness but also their safety and the safety of their loved ones. Social support was compromised during this crisis; the majority stayed away from their family. Sanghavi et al showed that social isolation negatively impacted residents' wellbeing with a 50% of resident experiencing anxiety during the pandemic [25]. With COVID-19 came a high morbidity and mortality rates. Residents had to deal with the death of their patients and the death of their loved ones. Nevertheless, the high turnover didn't allow them to have a time to grieve. Coping was mainly by social relatedness and seeking support from a family member, from col-

leagues or an expert. Nevertheless, some residents preferred social isolation and managed their stress by switching their attention to a solitary activity. In few instances, residents handled their stress through the unhealthy self-soothing behaviors like alcohol abuse. Suffering in times of crisis had a negative downstream effect on the quality of life and on the level of satisfaction. Residents regretted enrolling in medicine, and they were not satisfied with their work-life balance. This shows the burden that a resident physician might carry and explains why many of them end up withdrawing and changing their major. During the pandemic, problems arose on many levels leading to a disturbed mental and physical health [20,30]. In France, programs have been implemented to address residents' wellness. Residents in need have access to professional help and psychological support. However, they are still reluctant, even ashamed when it comes to acknowledge being in distress. The small number of respondents in this study could reflect the lack of interest, the lack of knowledge or perhaps the lack of trust in the system and in its capacity to evolve. The high levels of distress and burnout indicate that this approach is not optimized to promote wellness during a pandemic. The wellness programs implemented around the world during the crisis focused on HCP safety, social connectedness, and psychological support [31-33]. This survey identified some of the challenges that should be addressed in the wellness program. Thus, the need to intervene by focusing on three approaches: target residents' concerns and neutralize the stressors, implement strategies to face future crisis and promote residents' recovery during and post-crisis. Residents saw COVID-19 as a threat to their safety but also to their training. Working on reorganizing the services and on limiting the contact with patients without compromising the care would help support residents. Sustaining a minimum of didactic sessions would give them a sense of normalcy and stability. The work overload with the limited time and resources requires efficiency and communication at work; organizing regular meetings for updates on patients' management could help residents to stay current but also confident when treating their patients. To prioritize wellness is to promote self-care and resilience. Recognizing the signs of distress and seeking help should become a habit. To promote self-care, a first step would be to create a wellness group in each hospital. This group would organize support meetings and social gatherings where residents can connect with their peers and express their concerns freely. This group would also educate residents on burnout symptoms and would monitor the level of psychological distress by regular wellness assessment. When needed, they would recommend seeking an expert opinion. The COVID-19 crisis highlighted the importance of leadership and mentorship. A mentor would help the mentee in reaching their goals. He can offer advice, share his experience, and support the medical trainees. Hospitals should also contribute to maintaining residents' wellbeing by allocating resources and taking measures that would protect the healthcare professionals in the future. Asking for feedbacks from HCP might

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help in creating a protocol for managing patients during pandemics. The general surgery program in the University of British Columbia have created a similar program that minimizes the additional stress caused by COVID-19, promotes the culture of wellness, and encourages resilience [34]. Despite not having numbers to support the efficiency of these interventions, this program helped surgical residents in gaining insights to their moral purpose and in actively engaging to caring for the sick. In a study conducted in the US, meal support, program mentorship, contact with leadership and counseling services were considered very helpful. However, these interventions didn't improve the RSWBI scores and 34% of the residents found them useless¹⁸. New studies should be conducted to assess the best strategy in promoting wellbeing. There are several limitations in this study. The small sample makes it difficult to interpret the results. A selection bias might have been introduced since the residents interested in this study might be those who are having problems during their residency. Thus, the association between COVID-19 and residents' wellbeing might be overestimated and is not generalizable. The survey included subjective questions as well as questions requiring to remember events which might lead to a recall bias. Also, questions on incidence of COVID-19 related ICU admissions and mortality to assess the workload at the time of answering the questionnaire were missing. A causal relationship between risk factors, wellbeing, quality of life and satisfaction cannot be established since it is a cross-sectional study. Nevertheless, this survey should be seen as a pilot study showing that residents' wellbeing is a serious problem that needs to be addressed properly. Selection bias.

7. Conclusion

Even before the pandemic, residents faced distress, burnout, and depression. COVID-19 did not influence the prevalence of distress or burnout among residents, but it has increased the depressive symptoms and the intensity of stress. Residents were deprived from the family support and from the ability to acquire skills in their field. The consequences were a decrease in the quality of life, a regret of choosing medicine and a dissatisfaction of the work-life balance. During these difficult times, the best way to support residents and prevent psychological, social, and personal repercussions is to create a wellness program that promotes residents' wellbeing.

References

1. Albuquerque J, Deshauser D. Physician health: beyond work-life balance. *CMAJ*. 2014; 186 :E502-503.
2. Eckleberry-Hunt J, Van Dyke A, Lick D, Tucciarone J. Changing the Conversation from Burnout to Wellness: Physician Well-being in Residency Training Programs. *J Grad Med Educ*. 2009; 1: 225-230.
3. Raj KS. Well-Being in Residency: A Systematic Review. *J Grad Med Educ*. 2016; 8: 674-684.
4. Ishak WW, Lederer S, Mandili C. Burnout during residency training:

- a literature review. *J Grad Med Educ.* 2009; 1: 236-242.
5. Chirico F, Magnavita N. Burnout Syndrome and Meta-Analyses: Need for Evidence-Based Research in Occupational Health. Comments on Prevalence of Burnout in Medical and Surgical Residents: A Meta- Analysis. *Int J Environ Res Public Health.* 2019.
 6. Mata DA, Ramos MA, Bansal N. Prevalence of Depression and Depressive Symptoms Among Resident Physicians: A Systematic Review and Meta-analysis. *JAMA.* 2015; 314: 2373-2383.
 7. Frajerman A. La santé mentale des étudiants en médecine. 2020.
 8. Liu X, Chen J, Wang D. COVID-19 Outbreak Can Change the Job Burnout in Health Care Professionals. *Front Psychiatry.* 2020; 11: 563781.
 9. Kok N, van Gorp J, Teerenstra S. Coronavirus Disease 2019 Immediately Increases Burnout Symptoms in ICU Professionals: A Longitudinal Cohort Study. *Crit Care Med.* 2021; 49: 419-427.
 10. Dyrbye LN, Satele D, Sloan J, Shanafelt TD. Ability of the physician well-being index to identify residents in distress. *J Grad Med Educ.* 2014; 6: 78-84.
 11. Shaikh AA, Shaikh A, Kumar R, Tahir A. Assessment of Burnout and its Factors Among Doctors Using the Abbreviated Maslach Burnout Inventory. *Cureus.* 2019; 11: e4101.
 12. Riley MR, Mohr DC, Waddimba AC. The reliability and validity of three-item screening measures for burnout: Evidence from group-employed health care practitioners in upstate New York. *Stress Health.* 2018; 34: 187-193.
 13. Kroenke K, Spitzer RL, Williams JB. The PHQ-9: validity of a brief depression severity measure. *J Gen Intern Med.* 2001; 16: 606-613.
 14. Hu YY, Ellis RJ, Hewitt DB. Discrimination, Abuse, Harassment, and Burnout in Surgical Residency Training. *N Engl J Med.* 2019; 381: 1741-1752.
 15. Shanafelt TD, Gorringer G, Menaker R. Impact of organizational leadership on physician burnout and satisfaction. *Mayo Clin Proc.* 2015; 90: 432-440.
 16. Dyrbye LN, Thomas MR, Massie FS. Burnout and suicidal ideation among U.S. medical students. *Ann Intern Med.* 2008; 149: 334-341.
 17. de Boer AG, van Lanschot JJ, Stalmeier PF. Is a single-item visual analogue scale as valid, reliable and responsive as multi-item scales in measuring quality of life? *Qual Life Res.* 2004; 13: 311-320.
 18. Zoorob D, Shah S, La Saevig D, Murphy C, Aouthmany S, Brickman K. Insight into resident burnout, mental wellness, and coping mechanisms early in the COVID-19 pandemic. *PLoS One.* 2021; 16: e0250104.
 19. Cravero AL, Kim NJ, Feld LD. Impact of exposure to patients with COVID-19 on residents and fellows: an international survey of 1420 trainees. *Postgrad Med J.* 2020.
 20. G Miona. Psychological impact of the COVID-19 pandemic and burnout severity in French residents: A national study. *The European Journal of Psychiatry.* 2021; 35: 173-180.
 21. Fond G, Bourbon A, Lancon C. Psychiatric and psychological follow-up of undergraduate and postgraduate medical students: Prevalence and associated factors. Results from the national BOURBON study. *Psychiatry Res.* 2019; 272: 425-430.
 22. Rojo Romeo A, Fontana L, Pelissier C. Psycho-organizational and medical factors in burnout in French medical and surgery residents. *Psychol Health Med.* 2021; 1-11.
 23. Suryavanshi N, Kadam A, Dhupal G. Mental health and quality of life among healthcare professionals during the COVID-19 pandemic in India. *Brain Behav.* 2020; 10: e01837.
 24. Ursano R. Individual and Community Responses to Disasters. *Textbook of Disaster Psychiatry.* Cambridge University Press. 2017; 1-26.
 25. Sanghavi PB, Au Yeung K, Sosa CE, Veesenmeyer AF, Limon JA, Vijayan V. Effect of the Coronavirus Disease 2019 (COVID-19) Pandemic on Pediatric Resident Well-Being. *J Med Educ Curric Dev.* 2020; 7: 2382120520947062.
 26. Norris FH, Friedman MJ, Watson PJ, Byrne CM, Diaz E, Kaniasty K. 60,000 disaster victims speak: Part An empirical review of the empirical literature, 1981-2001. *Psychiatry.* 2002; 65: 207-239.
 27. Treluyer L, Tourneux P. Burnout among paediatric residents during the COVID-19 outbreak in France. *Eur J Pediatr.* 2021; 180: 627-633.
 28. Shultz J. Prevention of Disaster Impact and Outcome Cascades. *the Cambridge Handbook of International Prevention Science.* 2016: 492-519.
 29. Dimitriu MCT, Pantea-Stoian A, Smaranda AC. Burnout syndrome in Romanian medical residents in time of the COVID-19 pandemic. *Med Hypotheses.* 2020; 144: 109972.
 30. Sharifi M, Asadi-Pooya AA, Mousavi-Roknabadi RS. Burnout among Healthcare Providers of COVID- 19; a Systematic Review of Epidemiology and Recommendations. *Arch Acad Emerg Med.* 2021.
 31. O'Brien JM, Goncin U, Ngo R, Hedlin P, Chakravarti A. Professional fulfillment, burnout, and wellness of anesthesiologists during the COVID-19 pandemic. *Can J Anaesth.* 2021; 68: 734-736.
 32. Kang L, Li Y, Hu S. The mental health of medical workers in Wuhan, China dealing with the 2019 novel coronavirus. *Lancet Psychiatry.* 2020; 7: e14.
 33. Ripp J, Peccoraro L, Charney D. Attending to the Emotional Well-Being of the Health Care Workforce in a New York City Health System During the COVID-19 Pandemic. *Acad Med.* 2020; 95: 1136-1139.
 34. Lie JJ, Huynh C, Scott TM, Karimuddin AA. Optimizing Resident Wellness During a Pandemic: University of British Columbia's General Surgery Program's COVID-19 Experience. *J Surg Educ.* 2021; 78: 366-369.