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Perceived stress, anxiety and depressive symptoms among anaesthesia and intensive care residents: a French national survey

Short running title: French anaesthesia residents psychological distress

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Abstract

Background: Mental health and well-being is a significant problem for medical students in training. In this study, we aim to estimate the prevalence of anxiety and depressive symptoms, burnout and psychosocial distress in French residents in anaesthesia and intensive care.

Methods: A national online observational study used validated questionnaires (Hospital Anxiety and Depression Scale (HADS), Copenhagen Burnout Inventory (CBI), Perceived Stress Scale (PSS) and work-related questions (work-hours per week, night shift per month, safety rest after night shift, average time to start and end work, break time and time for lunch) to assess mental health and well-being of French residents in anaesthesia and intensive care.

Results: We obtained 519 answers (22.5% of 2302 students), 55% of respondents working in anaesthesia, 41% in intensive care at the time of study. Residents describe certain symptomatology in anxiety (19.8%) and depressive symptoms (7.8%). PSS identifies a perceived high stress (score > 27) for 55.7% of the subjects. The CBI questionnaire identifies 205 (38.9%) residents undergoing burnout, 80.7% working more than 48 h per week and 39.1% more than 60 hours. The duration of work per week (> 50 h), gender (female) and on-going training in intensive care are independent risk factors of psychological suffering. Lifestyle and level of training are not statistically identified risk factors.

Conclusion: This first online survey of French anaesthesia and intensive care residents reveals a significant frequency of anxiety and depressive symptoms, burnout and a link to potential targets of improvement in work conditions mainly related to the number of work hours per week.

Keywords: Anaesthesia, burnout, French, Intensive care, resident, training, survey

1 - Introduction

Physicians' mental health, consequences for themselves and for patient safety are increasingly explored [1]. Mental health can be compromised in different ways including anxiety, depression, perceived stress and burnout.

The problem also concerns residents since 20.9% to 43.2% of them show depressive symptoms [2], suicidal ideation affects 9.0% to 13.7% of the residents [3], and 26.4% show severe anxiety symptoms during clinical years [4]. Residents' mental health seems to get worse during their progression through medical training [2,5] and mental health status is related to medical errors and patient safety [6].

Burnout is a psychological syndrome, defined as a psychological syndrome resulting from exposure to chronic stress exceeding coping capacities, a prolonged response to chronic emotional and interpersonal stressors on the job [9]. The estimated prevalence is debated because of inconsistencies in definitions and assessment methods; recent systematic reviews reported an overall burnout prevalence among physicians ranging from 0% to 80.5% [8] and an overall burnout prevalence among residents of 35.7% to 75%, all specialties included [10,14].

French residents in anaesthesia and intensive care follow a mixed training, in anaesthesia and intensive care alternately, during 5 years. A 2008 French survey on the burnout

syndrome in anaesthetists and other practitioners in public hospitals in France (SESMAT survey) observed a prevalence of 50% in the two populations [15]. Given the frequency of the problem, the French College of Anaesthesia and Intensive Care created in 2013 the SMART Commission (Health at work for anaesthesiologists) and proposed solutions for professionals, for example a toll-free number. Few studies concurrently assess in residents psychosocial and mental health on various outcomes such as anxiety, depression, perceived stress and burnout.

The purpose of this national observational declarative survey was to assess different aspects of mental health including anxiety, depression, perceived stress and burnout with validated questionnaires, in the population of French anaesthesia and intensive care residents, to explore factors associated with these symptoms and evaluate potential aims for improvement in working conditions and well-being.

2 - Methodology

2.1 - Ethical review

This project received the approval of the French Society of Anaesthesia and Intensive Care Ethics Committee (IRB00010254-2018-167) and an agreement of the Commission Nationale Informatique et Liberté (2209297). Registration identified with Clinical trial number NCT04350151.

2.2 - Population

The target population was French anaesthesia and intensive care residents in training in early 2019, from the first to the fifth year of residency. This population was estimated to be 2302 students based on LegiFrance database [16].

2.3 - Survey period

After a pilot survey with a sample of 20 individuals, the questionnaire was launched at the beginning of 2019. One reminder was carried out between February 2019 and April 2019 and the survey was closed at the end of April 2019; this date was chosen as the residents finish their semester and start the following one in another service.

2.4 - Evaluation

The online document sent to residents includes the following questionnaires and questions:

- Hospital Anxiety and Depression Scale (HADS) - 14 questions in its French validated version exploring anxiety and depression (7 questions for anxiety and depression respectively) [17]. Each answer corresponds to a number (0 to 3). Adding these numbers together gives a total score for anxiety and depression. If the score is greater than or equal to 7, anxiety or depression can be suspected. If the score is greater than or equal to 11, it means that the resident is suffering from important anxiety and/or depression symptoms.
- Copenhagen Burnout Inventory (CBI) exploring signs of burnout [18]. This is a simplified survey assessment to evaluate a global stage of burnout, assessing three categories (personal burnout, work-related burnout and patient-related burnout) through a total of 19 positively or negatively worded questions, including six

questions for personal, seven questions for work-related and six questions for patient-related burnout. Responses to positive worded questions range from either “always” to “never/almost” or “to very high degree” to “to very low degree” (“always” or “to a very high degree” = 100, “often” or “to a high degree” = 75, “sometimes” or “somewhat” = 50, “seldom” or “to a low degree” = 25 and “never/almost never” or “to a very low degree” = 0). The negative questions are negatively scored. Total score on the scale is the mean of the scores on the items. Respondents are considered experiencing burnout for a subscale score >50.

- Perceived Stress Scale (PSS) [19] - 10 questions in its French validated version exploring perceived stress. PSS is a standardised and reliable scale designed to assess how much situations in life are perceived as stressful. Response options used a 5-point Likert scale ranging from 0 to 4. A score ≥ 27 is used as the cut-off for high stress.
- Contextual questions concerning residency in anaesthesiology and intensive care:
 - estimated average number of work-hours per week
 - average number of night shift per month,
 - application of safety rest after night shift,
 - the hour at which the resident starts and finishes the work period,
 - number of weeks' vacation (per semester).
- Lifestyle questions: need for pharmaceutical or psychological assistance, living alone or with someone (live at parent's home, in a couple, in a shared flat, in a student residence, in a hospital residence)
- The possibility to leave an optional written comment at the end of the survey

The questionnaire was sent by email to all anaesthesia and intensive care residents training regional coordinators (n = 28) and then transferred to the residents, regardless of their level of training (i.e. first to fifth year), under the guidance of the National College Anaesthesia and Intensive Care (Collège National des Enseignants en Anesthésie et Réanimation; CNEAR) and Young Anaesthetists Association (AJAR). The questionnaire was sent from an online platform, secured and administered by the University of Lyon. The data was analysed from an Excel® spreadsheet (Microsoft™, Redmond, USA).

2.5 - Analysis

The main criterion was the evaluation of depression and anxiety symptoms based on the HADS questionnaire, which is standardly defined by a score greater than or equal to 11 in at least one of the anxiety or depression components (HADS Anxiety and HADS Depression respectively). The secondary criteria include Copenhagen Burnout Inventory scores and the level of stress detected by the Perceived Stress Scale. This scale measures, over the past month, the degree to which life has been experienced as unpredictable, uncontrollable and overloaded. Work-related questions were analysed either in numerical value or in semi quantitative analysis.

Descriptive quantitative analyses were performed using Chi-squared test for categorical variables and Student's *t*-test for continuous variables.

For each of the studied outcomes, univariate linear regressions were performed with gender, ongoing training (anaesthesia or intensive care), level of training, lifestyle (living alone or not) and working hours (< 50, 50-60, 60-70, > 70 hours per week).

Multivariate analyses were then performed, first retaining variables with a *p*-value < 0.2 for at least one of their components in univariate analyses, then further refining the selection

through a backward stepwise regression procedure, with the Akaike Information Criterion (AIC) as a criterion for retaining a variable. Analyses were performed with R software version 4.0.2.

3 - Results

There were 520 returned surveys. There were no missing data: each questionnaire had to be entirely completed before being submitted. Only written comments were optional. One duplicated questionnaire was removed.

3.1 - Population (Table 1)

The questionnaire was answered by 519 distinct residents, which represents 22.5% of the national population. At the time of study, 55.0% of respondents worked in anaesthesia and 41.0% in intensive care; 59.6% were male and 28.2% of residents reported living alone. The breakdown into training level was as follows: 23.1% in the first year; 19.0% in the second year; 18.2% in the third year; 20.1% in the fourth year and 19.5% in the fifth year. The average time to complete the questionnaire was 18.3 min.

3.2 - Questionnaires on psychological distress (Table 2)

Certain anxiety (HADS-A anxiety score greater than or equal to 11) is found for 19.8% of residents and a certain depression (HADS-D depression score greater than or equal to 11) is found for 7.8% of residents.

The Perceived Stress Scale (PSS) finds a sense of high threat (PSS score > 27) for 55.7% of respondents.

Finally, the Copenhagen Burnout Inventory questionnaire mean score was 47.4 and 38.9% (n = 205) of the residents seemed concerned by burnout (CBI global score \geq 50). Two residents

(0.4%) have very high scores > 80 and 14 % had a global score > 60. The average score of the three subscales of CBI were personal burnout: 42.9; work-related burnout: 37.5 and patient related burnout: 31.5. Work-related burnout and personal burnout were higher in the Intensive Care group, female gender and high working hours per week.

3.3 - Need for pharmaceutical or psychological assistance

Three hundred and thirty-nine residents (65.0%) reported not requiring any assistance. The other residents had to use several types of resources: 63 (12.1%) consulted a therapist (psychiatrist, psychologist); 28 (5.3%) used doping products; 56 (10.7%) used anxiolytics; 30 (5.7%) used antidepressants; and 77 (14.8%) used sleeping pills.

3.4 - Work-related questions (Table 3)

Four hundred and twenty residents (80.7%) worked more than 48 hours per week and 204 (39.2%) more than 60 hours. Two hundred and thirty residents (44.2%) had more than 4 night shifts per month. A large majority of the residents (88.5%) had between 3 and 6 night shifts per month when 5.5% had more than 7 night shifts per month.

Safety rest after a night shift was applied for 92% of the residents when 2.5% responded they did not benefit from it and 5% not systematically.

3.5 - Results concerning professional orientation

Among residents, respectively 352 (67.6%), 144 (27.7%), 20 (3.8%) and 4 (0.7%) were totally convinced by their choice of anaesthesia and intensive care, rather convinced by their choice, had some doubt about continuing their anaesthesia and intensive care residency or plan to change specialty. Questions on professional orientation and written comments related to it could be analysed for 207 residents (39.8%). To explain these choices, main

written comments combine positive (versatility, transversality and holistic approach, technical skills, intellectual stimulation) or negative appreciations on the specialty (workload, difficulty to balance with personal life, night shift, fatigue, stress, deteriorated working conditions). Due to a high heterogeneity, we do not present the results here.

3.6 - Factors associated with psychological suffering (Table 4 & 5)

3.6.1 - Cumulative duration of work per week

Cumulative hours per week are associated with increased scores in all questionnaires (HADS, PSS and CBI) evaluating respectively anxiety, depression, perceived stress and burnout. Multiple linear regression adjusted for gender, level of training, on-going training (anaesthesia or intensive care) and number of work-hours per week were performed and identified that duration of work was an independent risk factor of psychological distress with a dose-response relation. This impact is significant both on HADS (depression and anxiety), PSS (stress) and CBI (Personal, Work and Patient total score) and is significant above 60 work-hours per week.

3.6.2 - Gender

Female gender is associated with increased scores in all questionnaires. Multiple linear regressions adjusted for number of work-hours per week, level of training, on-going training (anaesthesia or intensive care) confirms that this factor is an isolated risk factor of psychological distress. This impact is significant both on HADS (depression and anxiety), PSS (stress) and CBI (personal and work score).

3.6.3 - Life style, ongoing training and level of training

No significant impact of these three factors was globally observed on HADS, CBI and PSS questionnaires.

4 - Discussion

This first French national survey shows a significant part of residents in anaesthesia and intensive care with anxiety (19.8%) and depressive symptoms (7.8%). The results suggest that vigilance is needed. The volume of hours worked above 50-60 hours a week and female gender are independent factors associated with psychological distress.

4.1 - Issues and solutions

4.1.1 - Significant psychological symptoms for French anaesthesia and intensive residents

Our survey finds a prevalence of anxiety symptoms at 19.8% and depression symptoms at 7.8%. Incidence of depressive and anxiety symptoms are in line with studies [2,4] using the same questionnaire and population (9.3% and 20.3% respectively). The PSS revealed 55.7% of residents with high-perceived stress, which is superior to other studies with the same population (21.4% to 33.8%) [36,37]. Without a clinical exam, these anxious and depressive syndromes cannot be considered as medical diagnoses.

Burnout among physicians varies in frequency in the literature primarily due to the heterogeneity of the criteria used and multiple assessment tools. Indeed, in a vast review of international literature on psychological suffering at work compiling 182 studies published between 1991 and 2018 on 109 628 individuals in 45 countries, 47 distinct definitions of work-related distress are proposed and overall prevalence of burnout ranges from 0% to 80.5% [8]. In the French survey on anaesthetists in 2009, which included 1091 anaesthetists,

62.3% of individuals appeared burned out [20]. All together and whatever the methodology, the incidence of psychological distress among senior physicians is most often close to 50% without specificity for anaesthetists. This frequency was evaluated in the population of residents in medicine, surgery or anaesthesia with an estimated frequency varying from 45.2% and 75% [10–12]. Interestingly, in a recent systematic review and meta-analysis of burnout syndrome among medical residents, anaesthesia residents seem overexposed compared to other specialties (40.8% of burnout) [14]. In our study, burnout appears significant with 38.9%, which is slightly inferior to another study with a comparable design [21].

In the multivariate analysis, working time and female gender are associated with increased psychological distress whereas level of training, ongoing training and lifestyle has no impact. It should be noted that the markers of psychological distress are directly related to the volume of hours worked above respectively 50 h and 60 h per week for respectively CBI and HADS. Our results are in line with previous studies describing that long working hours (> 40-48 h/week) have been associated with poorer mental health, depressive state, anxiety and sleeping disorders [22,23]. In addition, medical errors seem to be higher in physicians or residents with burnout and distress [24–26], particularly when they endure long working hours as reported by previous studies [27]. The number of night shifts was not associated with increased psychological distress. It may be related to insufficient population size but also to the almost systematic application (92%) of safe rest after a night shift marking which had a real progression since the 2009 survey (69% of application) [20].

Female gender has also been identified previously as an exposing factor to burnout in medicine [28]. Factors involved in job stressors are more complex in female associating

quantitative demands, but also emotional and intellectual aspects, and a multidimensional gender gap has also been described including potentially professional and domestic factors [28,29]. This specific issue should be underlined since feminisation progresses in medicine generally and specifically in anaesthesia [30].

Beyond markers of psychological distress, it must be emphasised that since the beginning of their residency 12% of anaesthesia and intensive care residents had a consultation with a therapist and 37% had to use psychotropic drugs. The use of psychotropic drugs in anaesthesia can obviously be problematic for their vigilance. Seventy-two per cent of residents reported having episodes of daytime sleepiness sometimes or very often, which could have an impact on patient safety and their own health, particularly through a higher risk of motor vehicle crashes in case of extended work shift [31]. We also observed a discrepancy between a high frequency of psychotropic drug use (37%) and limited search of psychological support (12%) suggesting frequent auto medication. A quarter of the students have professional frustration and it is known that this frustration can lead to a change in specialty [10].

4.1.2 - Solutions to control work-related stress and dissatisfaction for anaesthesia residents

Existing regulations in France and Europe limit working time to 48 hours per week [32,33]. The volume of work-hours per week remains high, commonly exceeding (80.7%) this European limit of 48 hours per week and related regulation for residents [32,33]. This is independently and strongly linked to psychological distress in our survey. Solutions to improve residents' mental health should first include identification and potential control of departments exposing residents to excessive duration of work. Previous reports have indeed

already supported that reducing working hours in residents can reduce serious medical errors in intensive care units [27]. A key benefit of these results should also be the awareness of the problem by the faculties, the students themselves and the entire professional community of anaesthesia that share the responsibility to organise the training of these residents.

4.2 - Limitations and strengths of the study

This study is anonymous which facilitates declaration by the student. The sample size allows us to have rather robust results and supports causal analysis with certain professional or personal factors. The study is based on validated questionnaires, evaluating complementary aspects of the psychological distress at work.

The limits of the study are related to the declarative questionnaire without confirmation by clinical exam. Burnout is a controversial affliction, and the choice of questionnaire is debated. The Maslach Burnout Inventory (MBI), even though it is the main questionnaire used in that area, seems to have weaknesses too. MBI measures emotional exhaustion, depersonalisation and personal accomplishment domains. However, inconsistencies in definitions of burnout by MBI result in a very wide burnout prevalence [18,34,35]. The Copenhagen Burnout Inventory (CBI) has been recently developed in response to perceived limitations of the MBI [18]. The CBI includes three independent dimensions (personal, work-related and patient-related burnout), all crucial for evaluation of the work life of physicians and residents. It is partially consistent with the MBI on the emotional exhaustion aspects, but diverges for measurement of depersonalisation or individual's diminished sense of accomplishment. The CBI was used in similar recent studies [21,36], including a study on

anaesthesiologists in France [15]. Hence, we have decided to use the CBI, even if it would limit the comparison with other previous data, but this could be replicated in future studies. Our study focuses on the professional field, but the framework of the symptomatology of psychological distress is general (professional and/or personal). The response rate of 22.5% was obtained without incentive strategy, with a national email link and one reminder. Email surveys on physicians usually have a moderate to low participation rate, and a wide variety of factors affect the response rate [37], including the burden of the survey and the topic. In our study, we ask for the participants to answer several questionnaires about mental health and stress at work, which could be a painful field. Physician surveys may be less concerned about non-response bias than surveys of other populations [38] and the impact of this bias is discussed [39,40]. Furthermore, the response rate of our study seems consistent with similar studies [41,42]. We can also question the potential differences between our respondent population and the source population. Students who do not answer are the large majority and we cannot analyse their psychological profile with potential under or over-evaluation of the problem. We did not present the results of written comments analysis, but used them as qualitative data about main difficulties of residents, and targets for improvement in their training. It is possible that the coronavirus pandemic may change these results, which were collected in 2019.

5 - Conclusion

This first national online survey of French anaesthesia residents reveals a fairly high frequency of anxiety, depressive symptoms and burnout among this population that is working and studying. These results are in line with the literature on this population that suggest stability in the issues but no signs of improvement. The key finding is a strong link between long working hours and psychological distress, with a dose effect of the number of hours on the different psychological scores (HADS, PSS and CBI). This supports the actions aiming at controlling working time and schedules. Improving detection and care of distressed residents is a key to a better medical system, allowing greater capacities of adaptation when times are hard like during the COVID-19 pandemic.

Details of authors' contributions:

FJ: (conception and design of the study, analysis and interpretation of data, drafting the article and final approval of the version to be published); FM: (conception and design of the study, analysis and interpretation of data, drafting the article and final approval of the version to be published); PN: (conception and design of the study, analysis and interpretation of data, drafting the article and final approval of the version to be published); LD: (conception and design of the study, analysis and interpretation of data, drafting the article and final approval of the version to be published); BP: (conception and design of the study, analysis and interpretation of data, drafting the article and final approval of the version to be published); CD: (conception and design of the study, analysis and interpretation of data, drafting the article and final approval of the version to be published); DF: (conception and design of the study, analysis and interpretation of data, drafting the article and final approval of the version to be published).

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Table 1: population characteristics

	(n/%)
Total population	519
Gender	
Female	209 (40.3)
Male	310 (59.7)
Anesthesiology & Intensive Care Residency Study Year	
1st year	120 (23.1)
2nd year	98 (18.9)
3rd year	96 (18.5)
4th year	102 (19.7)
5th year	103 (19.8)
Ongoing Training	
Anesthesia	289 (55.6)
Intensive care	212 (40.8)
Other (Pain, Mobile Intensive Care, ...)	18 (3.4)
Way of Living	
Alone	146 (28,2)
Not Alone	373 (71,8)

Table 1: population characteristics

The anesthesia and intensive care residency last 5 years in France. It is divided into 10 semesters. Each semester, a French resident is working in an anesthesiology department or in an Intensive Care Unit.

Living not alone gathers: living at a parent's home, in a couple, in a shared flat, in a student residence, in hospital residence.

Table 2: variation of different questionnaires scores exploring psychological suffering depending of responder's characteristics

Questionnaire score	Mean (SD)	Gender			Ongoing training			Life style			Working hours per week (hours)				
		Male n=310	Female n=209	p	Anesthesia n=289	Intensive care n=212	p	With someone n=373	Alone n=146	p	<50 n=100	50-60 n=215	60-70 n=147	>70 n=57	P
HADS anxiety	7.1 (3.9)	6.5 (3.8)	8.1 (3.9)	<0.001	6.8 (3.7)	7.6 (4.1)	0.013	7.1 (3.9)	7.2 (4.1)	0.832	6.3 (3.4)	6.6 (3.6)	7.98 (4.3)	8.5 (4.2)	<0.001
HADS depression	4.3 (3.5)	3.8 (3.4)	4.9 (3.7)	0.001	3.94 (3.4)	4.72 (3.6)	0.014	4.2 (3.6)	4.4 (3.5)	0.654	3.23 (2.7)	3.82 (3.1)	4.8 (3.8)	6.6 (4.3)	<0.001
PSS Score	27.9 (6.8)	29.6 (6.7)	26.7 (6.6)	<0.001	26.9 (6.7)	29.2 (6.7)	<0.001	28 (6.8)	27.6 (6.8)	0.566	25.8 (6.5)	27.2 (6.6)	29.1 (6.2)	31.1 (7.8)	<0.001
CBI: Personal total average	42.9 (18.9)	49.8 (18.4)	38.3 (17.8)	<0.001	41.1 (18.6)	45.60 (19.3)	0.006	42.9 (18.6)	43.2 (19.6)	0.875	34.5 (16.2)	40.7 (17.4)	48 (18.8)	53.2 (20.6)	<0.001
CBI: Work total average score	37.5 (13.1)	39.8 (13.3)	35.9 (12.7)	0.001	36 (12.9)	39.7 (13.2)	0.002	37.5 (12.9)	37.4 (13.5)	0.933	33.6 (12.9)	36.9 (12.2)	38.6 (13.2)	43.6 (14)	<0.001
CBI: Patient total average score	31.5 (17.9)	33.3 (17.1)	30.3 (18.4)	0.064	29.2 (17.9)	34.8 (17.6)	0.001	31.8 (18.1)	30.7 (17.4)	0.512	26.2 (17.2)	30.1 (17.1)	34.8 (18.1)	37.8 (18.5)	<0.001

Questionnaire score	Vigilance problem					Medical error		
	Never	Rarely	Sometimes	Very often	p	No	Yes	p
HADS anxiety	4.7 (3.9)	5.7 (2.9)	6.9 (3.7)	9.5 (4.2)	<0.001	5.5 (3.7)	7.8 (3.9)	<0.001
HADS depression	2.3 (2.8)	2.9 (2.3)	4.3 (3.5)	5.9 (4.1)	<0.001	2.9 (2.7)	4.8 (3.7)	<0.001
PSS Score	22.8 (6.9)	25.1 (5.5)	27.8 (6.4)	31.9 (6.7)	<0.001	24.3 (5.7)	29.3 (6.6)	<0.001
CBI: Personal total average	28.80 (15.4)	32.2 (13.9)	43.2 (17.3)	56.3 (18.4)	<0.001	34.8 (17.2)	46.1 (18.5)	<0.001
CBI: Work total average score	29.9 (11.9)	32.1 (10.4)	37.5 (12.3)	44.3 (14.1)	<0.001	32 (11.8)	39.6 (12.9)	<0.001
CBI: Patient total average score	21.2 (19.9)	24.3 (19.9)	31.5 (17.2)	40.8 (19.1)	<0.001	25 (17.6)	34.1 (17.4)	<0.001

Questionnaires: CBI: Copenhagen Burnout Inventory questionnaire exploring signs of burnout on three axes: personal, professional and relational items; HADS: Hospital Anxiety and Depression Scale questionnaire exploring anxiety and depression; PSS: The Perceived Stress Scale

Responders characteristics: Ongoing training: when the residents fill the questionnaire they can be either in anesthesia or intensive care training; lifestyle: the residents are asked whether they live alone or with someone; working hours per week: estimated average number of hours of work per week; vigilance problem: the residents are asked whether they have some somnolence during the day and at what frequency; medical error: the residents are asked whether they were exposed to medical errors.

Values are mean score (SD) for each questionnaire

The tests carried out are Chi2 test for categorical variables and Student test for continuous variables.

Table 3: work characteristics

Work Characteristics	
Number of night shift (per month)	n (%)
3 to 4	258 (49,8)
5 to 6	201 (38,7)
7 to 8	29 (5,5)
Number of hours worked per week	
<50	100 (19,3)
50-60h	215 (41,6)
60-70h	147 (28,1)
>70h	57 (11,0)
Safety rest	
Yes	478 (92,1)
No	13 (2,5)
Not systematic	28 (5,4)
Beginning of working day	
Before 7am	10 (1,9)
7 to 8 am	341 (65,8)
8 to 9 am	165 (31,7)
After 9 am	3 (0,5)
End of working day	
Before 6 pm	195 (37,5)
6 to 7 pm	257 (49,7)
7 to 8 pm	61 (11,7)
After 8 pm	6 (1,1)
Number of weeks' vacation (per semester)	
< 1 week	6 (1,1)
1 to 2 weeks	248 (48,0)
2 to 3 weeks	237 (45,6)
3 to 4 weeks	19 (3,6)
> 4 weeks	9 (1,7)

Duration of work per week: estimated average number of hours of work per week; safety rest: the residents have a 12hours rest after a night shift; a night shift follows generally a work day - thus 24 hours workload approximately. A week's vacation corresponds to 7 days not working in the hospital, which may or may not be consecutive.

Data are presented as number (%)

Table 4 - Univariate Analysis of HADS, PSS and CBI scores

		HADS Anxiety		HADS Depression		PSS		CBI Patient		CBI Personal		CBI Work	
		Coefficient (CI95)	p value	Coefficient (CI95)	p value	Coefficient (CI95)	p value	Coefficient (CI95)	p value	Coefficient (CI95)	p value	Coefficient (CI95)	p value
Gender	Female	Ref		Ref		Ref		Ref		Ref		Ref	
	Male	-1.63 (-2.30;-0.95)	<0.001	-1.08 (-1.69; -0.47)	<0.001	-2.84 (-4.01;-1.67)	<0.001	-2.96 (-6.10;0.17)	0.064	-11.48 (-14.64;-8.31)	<0.001	-3.92 (-6.19;-1.64)	<0.001
Level of Training	1st year	Ref		Ref		Ref		Ref		Ref		Ref	
	2nd year	0.27 (-0.78;1.31)	0.628	0.059 (-0.87;0.98)	0.900	1.32 (-0.46;3.11)	0.146	5.03 (0.34;9.72)	0.035	3.65 (-1.28;8.59)	0.147	3.27 (-0.20;6.75)	0.064
	3rd year	0.73 (-0.32;1.78)	0.174	1.52 (0.58;2.45)	0.001	2.78 (0.98;4.58)	0.002	7.19 (2.47;11.91)	0.002	9.11 (4.13;14.07)	<0.001	3.25 (-0.24;6.74)	0.068
	4th year	1.25 (0.21; 2.28)	0.018	1.45 (0.52;2.37)	0.002	2.91 (1.14;4.69)	0.001	11.66 (7.02;16.31)	<0.001	11.23 (6.34;16.12)	<0.001	5.35 (1.91;8.79)	0.002
	5th year	0.96 (-0.07;1.99)	0.069	1.06 (0.14;1.98)	0.023	1.39 (-0.37;3.16)	0.122	5.51 (0.88;10.14)	0.019	5.38 (0.51;10.26)	0.030	2.26 (-1.16;5.69)	0.195
Working hours	50 hours	Ref		Ref		Ref		Ref		Ref		Ref	
	50 to 60 hours	0.26 (-0.65;1.17)	0.575	0.59 (-0.21;1.39)	0.152	1.38 (-0.18;2.95)	0.083	3.88 (-0.28;8.05)	0.068	6.28 (2.01;10.54)	0.003	3.31 (0.26;6.36)	0.032
	60 to 70 hours	1.69 (0.71;2.67)	<0.001	1.56 (0.69;2.42)	<0.001	3.25 (1.57;4.93)	<0.001	8.55 (4.07;13.03)	<0.001	13.54 (8.96;18.12)	<0.001	5.00 (1.73;8.27)	0.002
	> 70 hours	2.24 (0.98;3.49)	<0.001	3.33 (2.22;4.44)	<0.001	5.27 (3.12;7.42)	<0.001	11.58 (5.85;17.31)	<0.001	18.75 (12.90;24.61)	<0.001	9.97 (5.79;14.15)	3.567
Ongoing Training	Anaesthesia	Ref		Ref		Ref		Ref		Ref		Ref	
	Intensive Care			0.78 (0.16;1.40)	0.0136	2.22 (1.03;3.40)	<0.001	5.60 (2.45;8.75)	<0.001	4.46 (1.11;7.81)	0.009	3.71 (1.40;6.02)	0.001
Life Style	Living not alone	Ref		Ref		Ref		Ref		Ref		Ref	
	Living alone			0.154 (-0.52;0.83)	0.654	-0.37 (-1.67;0.91)	0.565	-1.14 (-4.58;2.28)	0.512	0.28 (-3.32;3.90)	0.875	-0.10 (-2.61;2.40)	0.932

Coefficients correspond to linear regression coefficients. CI95 corresponds to the 95% confidence interval associated, calculated by the "classical" method (ie. $\mu \pm 1.96 * \sigma / \sqrt{n}$) where μ is the mean σ the standard deviation, with the hypothesis that these scores follow a gaussian distribution (assumption possible as soon as $n > 30$).

HADS : Hospital Anxiety & Depression Scale

PSS : Perceived Stress Scale

CBI : Copenhagen Burnout Index

Table 5 - Multivariate analysis for HADS

		HADS Anxiety		HADS Depression		PSS		CBI Patient		CBI Personal		CBI Work	
		Coefficient	p value	Coefficient	p value	Coefficient	p value	Coefficient	p value	Coefficient	p value	Coefficient	p value
Gender	Female	Ref		Ref		Ref		Ref		Ref		Ref	
	Male	-1.69 (-2.36;-1.01)	<0.001	-0.96 (-1.56; -0.36)	0.001	-3.04 (-4.19;-1.89)	<0.001	-2.58 (-5.69;0.52)	0.103	-10.85 (-13.92;-7.78)	<0.001	-3.95 (-6.22;-1.67)	<0.001
Level of Training	1st year	Ref		Ref		Ref		Ref		Ref		Ref	
	2nd year			-0.33 (-1.24;0.57)	0.473			4.09 (-0.61;8.79)	0.088	1.93 (-2.71;6.59)	0.413		
	3rd year			1.12 (0.21;2.03)	0.015			5.98 (1.27;10.69)	0.012	6.55 (1.89;11.20)	0.005		
	4th year			0.70 (-0.21;1.62)	0.132			10.08 (5.31;14.86)	<0.001	6.75 (2.03;11.47)	0.005		
	5th year			0.98 (0.08;1.88)	0.032			5.95 (1.28;10.61)	0.012	5.31 (0.70;9.92)	0.024		
Working hours	50hours	Ref		Ref		Ref		Ref		Ref		Ref	
	50 to 60 hours	0.17 (-0.74;1.09)	0.712	0.63 (-0.17;-0.36)	0.125	1.38 (-0.18;2.95)	0.207	2.78 (-1.48;7.06)	0.200	5.80 (1.62;9.98)	0.006	3.11 (0.01;6.21)	0.048
	60 to 70 hours	1.59 (0.59;2.60)	0.001	1.64 (0.76;2.52)	<0.001	2.87 (1.17;4.58)	<0.001	6.78 (2.08;11.48)	0.004	13.50 (8.99;18.02)	<0.001	4.63 (1.24;8.01)	0.007
	> 70 hours	1.79 (0.48;3.10)	0.007	3.23 (2.08;4.37)	<0.001	4.16 (1.94;6.38)	<0.001	8.08 (1.90;14.27)	0.010	17.88 (12.01;23.76)	<0.001	9.19 (4.79;13.60)	<0.001
Ongoing Training	Anaesthesia	Ref		Ref		Ref		Ref		Ref		Ref	
	Intensive Care	0.56 (0.11;-0.14)	0.117			1.56 (0.37;2.76)	0.010	3.82 (0.60;7.04)	0.020			2.39 (0.02;4.76)	0.047
Life Style	Living not alone	Ref		Ref		Ref		Ref		Ref		Ref	
	Living alone											-0.10 (-2.61;2.40)	0.932

Coefficients correspond to linear regression coefficients. CI95 corresponds to the 95% confidence interval associated, calculated by the "classical" method (ie. $\mu \pm 1.96 * \sigma / \sqrt{n}$) where μ is the mean σ the standard deviation, with the hypothesis that these scores follow a gaussian distribution (assumption possible as soon as $n > 30$).

Some boxes are empty because the associated risk factor is not significant in the multivariate analysis.

HADS : Hospital Anxiety & Depression Scale

PSS : Perceived Stress Scale

CBI : Copenhagen Burnout Index

The sign of a coefficient for a given variable can be interpreted as followed: if it is positive, then all other variables being equal, this given variable increases on average the score studied. The opposite is true if the sign is negative. The value of the coefficient is the average amount of variation of the score studied for an increase of one unit of the variable in question.