

On-call stress among Finnish anaesthetists★

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Summary

We investigated on-call stress and its consequences among anaesthetists. A questionnaire was sent to all working Finnish anaesthetists ($n = 550$), with a response rate of 60%. Four categories of on-call workload and a sum variable of stress symptoms were formed. The anaesthetists had the greatest on-call workload among Finnish physicians. In our sample, 68% felt stressed during the study. The most important causes of stress were work and combining work with family. The study showed a positive correlation between stress symptoms and on-call workload ($p = 0.009$). Moderate burnout was present in 18% vs 45% ($p = 0.008$) and exhaustion in 32% and 68% ($p = 0.015$), in the lowest vs highest workload category, respectively. The symptoms were significantly associated with stress, gender, perceived sleep deprivation, suicidal tendencies and sick leave. Being frequently on call correlates with severe stress symptoms and these symptoms are associated with sick leave.

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★A poster of the study 'Being on call causes multiple stress symptoms among anaesthetists' has been presented at All Africa Anaesthesia 2005 – congress in Hammamet in May 2005. An abstract of the study has been published in the proceedings of the Finnish Medical Convention that was held in January 2006. A poster of the study was presented at the same convention.

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Data on mortality including suicide, morbidity and stress levels of anaesthetists suggest that they may be more adversely affected by the conditions in which they practise than are other medical specialists [1–11]. The causes of their stress appear to be high workload, organisational issues, working atmosphere, difficulties in combining family with work, and being on call [5, 8, 12, 13].

Anaesthetists in many countries continue to work 'on call' and do night shifts until the age of retirement. Being on call may be stressful for several reasons: sleep deprivation, excessive volume of work, requirement to work quickly, unpredictability of the nature of work, and lack of opportunity for consultation. Chronic sleep deprivation and night work are connected to serious health problems such as metabolic syndrome and breast

cancer [14–17]. Both short and excessively long sleep are associated with higher mortality in humans [18]. The other above-mentioned stressing factors may increase the stress experience of a sleep-deprived anaesthetist.

It appears that for anaesthetists the stress of being on call is connected to ill-health. Previous studies have focused on the impact of residents' sleep deprivation on steroid excretion, cognitive performance and patient safety [19, 20]. However, the perceived stress connected to calls, the stress symptoms when on call, and the symptoms as possible indicators of ill-health have not been addressed. The aim of this study was to measure the degree of stress and burnout, and investigate on-call related stress symptoms and consequences of stress among

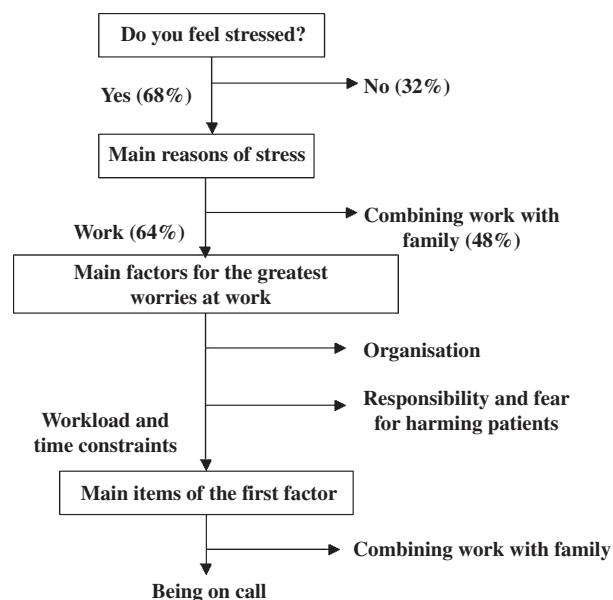


Figure 1 Study configuration.

specialist anaesthetists in Finland (Fig. 1). 'Being on call' refers here to both being resident at home and in the hospital unless the prefix 'home' or 'hospital' is added.

Methods

Participants

In March 2004, a postal survey with a covering letter was sent to all working Finnish anaesthetists living in Finland ($n = 550$). A reminder was sent in October 2004. The participants' names were taken from the register of the Finnish Medical Association, which covers all licensed physicians in Finland. The criteria for inclusion were specialty of anaesthesia (and intensive care) and permanent residence in Finland. A total of 328 anaesthetists (60%) responded.

Data

The survey contained modified standardised questions about demographic items, employment, working environment, stress and burnout, being on call and well-being, life quality, work satisfaction and performance, general health experience, health behaviour, psychosocial support and retirement. Some open anaesthesia-specific questions were included. Each respondent was also given the opportunity to add free narrative comments at the end of the questionnaire.

For the present study the data (137 questions) were categorised as follows:

Demographic data: gender; age in years; work pattern (full time, part time, partly retired), place of work.

On-call data: number of years' experience of being on call (residence included); whether presently on an on-call rota (1 = not currently on call, 2 = currently on call); number of home and hospital calls a month; length of the on-call work period in hours; percentage of active hours when on call.

Four categories of on-call workload were created:

- 1 not currently on call or having solely home calls,
- 2 1–2 hospital calls a month,
- 3 ≥ 3 hospital calls a month with $< 80\%$ activity,
- 4 ≥ 3 hospital calls a month with $\geq 80\%$ activity.

Stress:

- A modified Occupational Stress Questionnaire [21] was used: 'Do you feel stressed these days?' (1 = no, 2 = to some extent, 3 = clearly);
- Causes of stress (work, family, combining work with family, health, economical situation, close personal relationships, other) [21];
- Worries at work (26 questions covering time constraints, workload, working atmosphere, contents of work, professional control, combining work with family, lack of rest, responsibility (1 = never or very seldom, 2 = rarely, 3 = sometimes, 4 = quite often, 5 = very often or continuously) [21].

The Cronbach's alpha calculated for worries at work was 0.92.

On-call stress symptoms: After a literature review, a questionnaire was created to elucidate the symptoms connected to sleep deprivation and stress of being on call [14–16, 22–24]. The symptom list was supplemented by the symptoms reported by 16 anaesthetists when on call. Altogether, 36 symptoms were listed and the respondent was asked to state whether he/she had the symptom while being on call or the day after, and after having been on vacation for 2 weeks (Table 1). The reliability coefficient Cronbach's alpha for the list of symptoms was 0.88. A sum variable of on-call symptoms, the symptom average, was formed. The Cronbach's alpha for the symptom average was 0.87.

Burnout was assessed by using a Finnish adaptation of the Maslach Burnout Inventory (MBI) [25], which consists of 22 questions relating to the three components of burnout: emotional exhaustion, cynicism and reduced professional efficiency. The MBI requires respondents to categorise their response to each question using a standard 7-point response format with anchored points of 'never' to 'every day'. A standard coding template was used to score the results of the three dimensions of burnout. The scores are categorised as none (1), moderate (2) or severe (3) according to predetermined cut-off scores based on data from an average population in Finland [26]. The MBI version used in this study was specifically designed for use with health professionals and has undergone testing and validation in a medical and nursing

Table 1 Question of symptoms. 'Do you usually have following symptoms? (a) when having been two weeks on vacation and (b) when on call or the day after' (1 = no, 2 = yes).

	On call		On vacation		Ratio
	%	n	%	n	
Somatic symptoms					
Yawning	68.5	311	12.3	302	5.6
Sleep disturbances	65.1	312	16.4	305	4.0
Feeling cold	55.2	310	6.9	304	8.0
Headache	42.5	313	8.5	306	5.0
Nasal congestion	41.0	310	15.2	303	2.7
Peripheral oedema	38.6	311	4.9	304	7.8
Dyspepsia	35.5	313	13.4	306	2.6
Arrhythmias	30.0	313	8.2	306	3.7
Abdominal pain	22.7	308	5.6	304	4.1
Other pain	22.3	309	12.2	303	1.8
Dizziness	17.5	309	1.3	303	13.2
Watery eyes	15.3	307	4.6	302	3.3
Prone to infections	14.2	310	2.3	303	6.1
Nausea	11.6	310	0.7	305	17.7
Tremor	10.0	310	1.0	304	10.1
Sweating	9.7	309	2.6	303	3.7
Rash	9.7	310	4.0	303	2.4
Chest pain	3.9	309	0.7	303	5.9
Mental symptoms					
Exhaustion, fatigue	84.6	312	6.2	306	13.6
Irritation	68.7	313	7.5	307	9.2
Feeling guilty about not being able to take proper care of responsibilities	29.2	312	7.2	305	4.1
Tearfulness, depression	23.2	310	3.3	303	7.0
Uncertainty, anxiety, phobias	18.4	310	3.9	304	4.7
Nightmares	7.7	310	3.0	305	2.6
Self destructiveness	5.4	312	1.6	306	3.3
Cognitive symptoms					
Memory disturbances	45.8	143	9.5	305	4.8
Speaking difficulties	30.2	94	3.3	304	9.2
Falling asleep during activity	27.0	84	4.9	305	5.5
Co-ordination disturbances	16.8	52	1.0	304	17.0
Orientation disturbances	14.9	46	1.7	301	9.0
Difficulties in understanding speech	13.9	43	1.3	303	10.5
Other cognitive disturbances	12.1	34	0.0	278	
Behavioural symptoms					
Need for alcohol	30.5	94	18.4	304	1.7
Bulimia	16.2	50	6.0	300	2.7
Need for sleeping medicine	15.8	49	5.0	303	3.2
Other	1.4	3	0.8	121	1.8

Ratio = the ratio of frequencies of symptoms when on call vs when on vacation.

population. In addition to MBI indices, we used the same burnout indicator as in the nationwide study of Finnish physicians [21, 27]: $(0.40 \times \text{Emotional Exhaustion}) + (0.30 \times \text{Cynicism}) + (0.30 \times \text{Lack of Professional Efficacy})$ [26, 27]. The factor-based Cronbach's alpha reliability coefficients in the previous Finnish study vary between 0.87 and 0.96.

Sleep:

- Amount of sleep a day (accurate to the nearest 0.5 h);
- 'Do you sleep and rest enough?':

'What do you think are the reasons for too little sleep?' (workload, lack of time, sleep disturbance, bad health, call/duty, other work-related reasons, other stressful life factors, going to bed too late, alcohol consumption, external disturbance (crying baby, noise, uncomfortable bed), free time interests, other reason, what?) [28].

Suicide: 'Have you ever seriously thought or planned to commit suicide?' (1 = never, 2 = I have thought, 3 = I have seriously planned, 4 = I have tried) [21].

Have you been on *sick leave* during the past year? (1 = no, 2 = yes).

Suggestions for improvement regarding the on-call system (open question).

Main outcomes

The primary outcome was the list of symptoms associated with on-call stress. The other main outcomes were: data about the on-call workload of the anaesthetists; their stress levels and reasons for stress; on call-related stress and burnout; and the data showing associations between on-call stress symptoms and sleep deprivation and objective ill-health.

Statistical analyses

The data were analysed with SPSS for WINDOWS Release 12.01, mainly by frequency, cross-tabulation, *t*-test for independent samples, one-way ANOVA and correlations. Factor analysis was used for MBI and worries at work question list. The dependent variable (symptom average) was continuous and did not differ significantly from normal distribution. Correlations were used to check the associations between the continuous dependent and independent variables and to choose the final variables. They were tested with linear regression analysis, first univariate and then multivariate (regression coefficients, standard deviations in tables). The Chi-squared test was applied for the preliminary analysis and logistic regression for the chosen models of categorical variables (Odds ratio (OR), 95% confidence interval (CI) in tables). A *p*-value of <0.05 was chosen to measure significance. Reliability was examined by calculating the Cronbach's alpha coefficients for sets of variables without previous reliability information. A sample-specific comparison was also done between the same individual at work and after a holiday period.

Results

Characteristics of the participants

Of the respondents ($n = 328$), 53% (175) were men and 47% (153) women. The mean age was 47 years (range 32–69; SD 7.8). Seventy-nine per cent were working full

Table 2 Age (ANOVA, $F = 11.121$, $p < 0.001$) and gender distribution in on-call workload categories.

On-call categories	n/Female %	Age		
		Mean	Range	SD
Category 1	101/45	50.2	37–69	7.6
Category 2	86/49	48.4	34–63	7.4
Category 3	73/48	45.4	32–67	7.1
Category 4	66/45	44.2	32–61	7.7
Total	326/45	47.4	32–69	7.8

time, 12% part time and 9% were partly retired. Most of the respondents (51%) were working at a university hospital, 26% at a central hospital, 13% in a district hospital and 3% in the private sector. They had worked in the field of anaesthesia for a mean of 19 years (range 5–36; SD 8.2).

The on-call workload

Our data showed that 69% of specialist anaesthetists did night duty in hospitals. The respondents had been working on call for an average of 18 years (range 5–40; SD 8.1). The in-hospital work period lasted 14–38 h, 24 h being the average. The anaesthetists had both hospital (range 1–7) and home (range 0–18) calls three times a month on average. The average activity for hospital calls was 81% and for home calls 29%. They had on average 13 active on-call hours per week.

Young specialists had more calls per month than their older counterparts. There were no gender differences in the category distribution (Table 2).

Stress

Sixty-eight per cent of the respondents felt stressed. Perceived stress increased with workload ($p = 0.02$) (Table 3B, Fig. 2). The main self-reported reasons for stress were: work in 64% (79% in category 4) and combining work and family in 48% of cases (Fig. 1). Health, family, personal relationships and financial issues were mentioned by 17%, 16%, 13% and 12% of the respondents, respectively. The three main factors of 'worries at work' determined by factor analysis were:

- Time constraints and excessive workload;
- Work-place atmosphere and organisational issues;
- Responsibility and fear of harming patients.

The most stressful individual items of the first factor were combining work with family and being on call.

Stress symptoms

The most frequent symptoms when on call were: exhaustion, irritation, yawning, sleep disturbances,

Table 3 Data of the mean comparable variables.

Study groups	n (%)	Active on-call hours a week (mean)	Burnout %		Emotional exhaustion %		Cynicism %		Lack of professional efficacy %	
			M + S (S)		M + S (S)		M + S (S)		M + S (S)	
			All	Cat 4	All	Cat 4	All	Cat 4	All	Cat 4
A:			n = 287	n = 60	n = 317	n = 62	n = 314	n = 62	n = 291	n = 62
				p = 0.008		p = 0.015		p = 0.039		p = 0.085
Anaesthetists 2004	328 (60)	13	28 (0.4)	45 (0)	48 (10)	68 (11)	33 (2)	45 (5)	17 (1)	27 (2)
Stressed %										
			M + S (S)		Having been on sick leave %		Suicidal tendencies %			
			All	M + S	All	Cat 4	All			
B:			n = 326	n = 65	n = 325	n = 66	n = 326			
				p = 0.02			p = 0.040			
							Cat 4			
							n = 66			
Anaesthetists 2004	68 (13)	80 (22)	47	53	25	26	p > 0.05			
M + S, both Moderate and Severe; (S), Severe only; Cat, Workload category.										

M + S, both Moderate and Severe; (S), Severe only; Cat, Workload category.

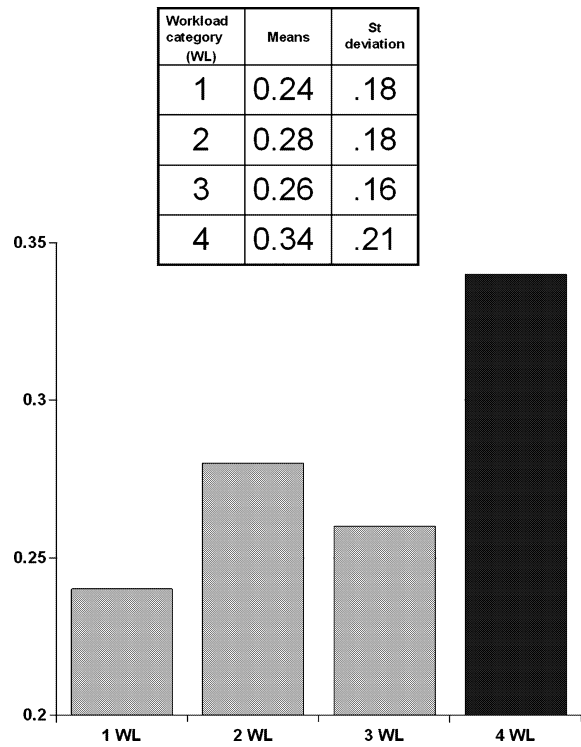


Figure 2 Means of symptom averages (y-axis) for difficult on-call workload categories (x-axis) ($F = 3.93$, $p < 0.01$).

Table 4 Age-adjusted significance of differences in stress-related symptoms between on-call workload categories and gender (ANOVA).

Source	F-test	p-value
Age	5.803	0.017
Gender	10.579	0.001
On-call category	3.425	0.018
Gender*On-call category	2.961	0.032

feeling cold, memory disturbances and headache (Table 1, Fig. 3). However, the biggest on-call *vs* on-vacation ratios were between the following stress symptoms: nausea, co-ordination disturbances, exhaustion, dizziness, difficulties in understanding speech and tremor. The most significant difference in symptoms was within the individual when on call and on vacation. There was a significant positive correlation between symptoms and workload (Table 4, Figs 2 and 3). The association between gender and symptoms was statistically significant. Women had on average 9% more symptoms than men (Fig. 3). Age correlated negatively with the symptoms ($r = -0.22$, $p < 0.001$): younger anaesthetists had more symptoms than their older colleagues.

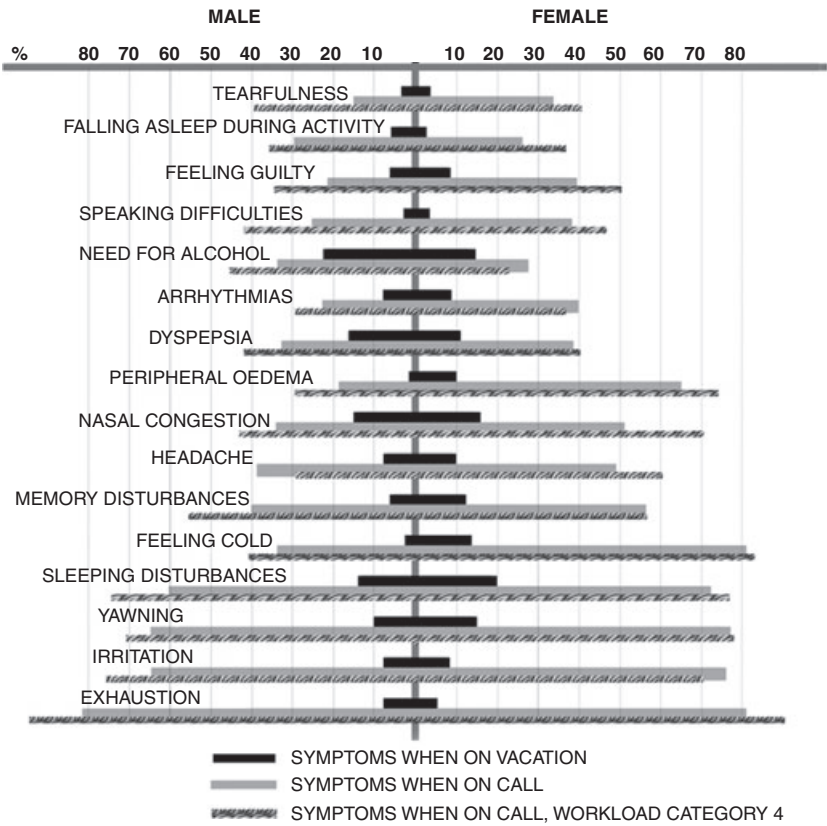


Figure 3 Frequencies of symptoms for men and women when on vacation (Categories 1–4) and when on call (Categories 1–4, Category 4).

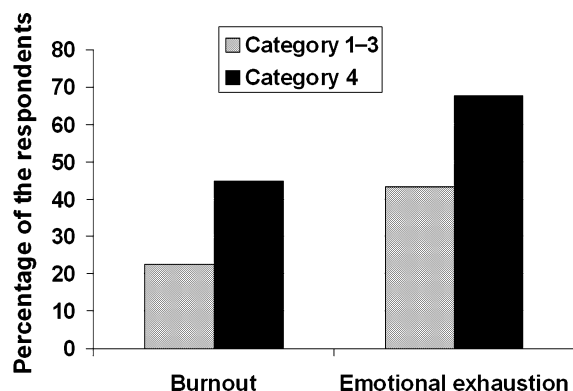


Figure 4 Burnout indicator and emotional exhaustion in on-call workload categories 1–3 and 4.

Burnout

Emotional exhaustion and burnout increased with strain and amount of duties. Exhaustion was reported by 32% in the lowest and 68% in the highest workload category, burnout by 18% and 45%, respectively. Figure 4 shows burnout and emotional exhaustion in categories 1–3 *vs* category 4. The figures for the burnout indicator and its separate indices can be seen in Table 3A. Exhaustion was 8% more frequent among women than men, but the difference was not statistically significant. In category 4, the risk for emotional exhaustion adjusted for age and sex was 1.4 compared to category 1 (OR = 1.4, 95% CI 1.1–1.7). The risk for burnout, respectively, was 1.3 (OR = 1.3, 95% CI 1.1–1.6).

Sleep

The respondents slept a mean of 7 h (range 5–9). Forty-six per cent of all, and 38% in workload category 4, slept sufficiently ($p = 0.037$). The figure was 36% for women and 54% for men ($p < 0.001$). The most frequently reported reason (30% of respondents) for perceived sleep deprivation was being on call.

Suicidal tendencies

A quarter (25%) of all respondents had thought of committing suicide, and 2% had seriously planned it (Table 3B). Figures were similar for all workload categories and both genders. Suicidal tendencies were associated with sleep disturbances ($p = 0.009$).

Sick leave

Forty-seven per cent of the respondents had been on sick leave during the past year (Table 3B). The figures were 52% for women, 43% for men ($p = 0.08$) and 53% in category 4 ($p = 0.04$), respectively.

Symptom average and gender, stress, sick leave, sleep deprivation and suicidal tendencies

The on-call symptom average was significantly associated with gender, stress, sick leave, perceived sleep deprivation and suicidal tendencies. Stress and suicidal tendencies had common aspects and were analysed separately in the final multivariate model 2 (Table 5).

Suggestions for improvement

There were 114 free text suggestions for improving the on-call system. The most frequent improvement suggestions were:

- shortening the on-call period in 89% (101);
- reducing the on-call frequency in 30% (34);
- always having two days off a week in 26% (30);
- having no obligation to be on call after 50 years of age in 1% (11).

Discussion

The data from this study indicate how the work environment – especially the on-call workload – of anaesthetists contributes to significant deleterious stress symptoms, some of which can, over time, lead to the development of chronic disease. Stress is endemic in an anaesthetist's work [5], especially during on-call duty,

Table 5 Associations between gender, sleep sufficiency, sick leave, suicide and symptom average.

Variables	Univariate model			Multivariate model 1			Multivariate model 2		
	Stand. c. Beta	t-test	p-value	Stand. c. Beta	t-test	p-value	Stand. c. Beta	t-test	p-value
(Age)	–0.184	–3.063	0.002	0.027	0.478	0.633			
Gender	0.242	4.105	0.000	0.195	3.519	0.001	0.168	3.002	0.003
Stress	0.414	7.455	0.000	0.322	5.420	0.000			
Sleep sufficiency	–0.362	–6.366	0.000	–0.183	–3.159	0.002	–0.269	–4.694	0.000
Sick leave	0.252	4.265	0.000	0.118	2.148	0.033	0.162	2.882	0.004
Suicide	0.246	4.163	0.000	0.086	1.537	0.125	0.158	2.802	0.005

Dependent variable: symptom average.

when one has to work extremely long hours, resisting sleep and taking responsibility for difficult, unpredictable cases without the opportunity for proper consultation. The anaesthetist's work has been reported to contain higher momentary stress and more unexpected stressful situations than the work of any other physician [29].

In our study, 68% of all working anaesthetists and 80% of those with the highest on-call burden reported feeling stressed. In a nationwide study of Finnish physicians done in 1997 [21], the figure was 80% for all anaesthetists, indicating higher stress levels than among other physicians. Work was the greatest source of the anaesthetists' stress and combining work with family the second greatest both in 1997 and in our study. In our data, 'worries at work' were divided by factor analysis into three main factors:

- general workload and time constraints;
- work atmosphere and organisational problems;
- responsibility and fear of harming patients.

Our results of high stress levels and reasons for stress are supported by international findings [4, 5, 8, 29]. Being on call was among the most frequently mentioned stressors both in our and in the 1997 study with regards to workload and time constraints.

The on-call burden of anaesthetists was the highest of all physicians in 2004 when our data were compared with the study of all specialists done by the Finnish Medical Association. According to our data, the anaesthetists had the greatest amount of on-call active hours among all specialists.

Being on call correlated strongly with various stress symptoms. The symptoms increased with increasing on-call workload and almost disappeared during vacation. The anaesthetists reported most often having mental and somatic symptoms, followed by cognitive and behavioural symptoms. In Weinger and Ancoli-Israel's study, sleep deprivation had the greatest impact on mood and cognitive tasks and a smaller but still significant impact on motor tasks [24]. The most frequent somatic symptoms in our study were arrhythmias and dyspepsia, which is supported by shift work studies [30]. The incidence of many symptoms within an individual was 8–10 times higher when on call than when on vacation (Table 1, Fig. 3). These kinds of stress symptoms when repeated or prolonged are known to be signs of impairment of different essential organ functions. The subjects had been on call – and sometimes had had symptoms – for nearly 20 years. The exact mechanisms that may lead from perceived stress to symptoms and objective diseases are still unclear, but it is known that the human defence system when exposed to stress shows changes in inter-linked endocrine, immune, and nervous pathways [31–35].

Our study revealed that moderate burnout is not uncommon among Finnish anaesthetists and that it is significantly connected to stress and on-call work burden. Nevertheless, even though the anaesthetists had high scores for emotional exhaustion, their professional efficacy scores were high, which can be explained by their long careers and good professional skills, thus lowering the overall burnout indicator. Lack of professional efficacy had decreased significantly from 51% to 17% between 1997 and our study, which was a surprisingly positive finding [21]. When these indices of burnout were compared to other medical groups and the average population in Finland, specialist anaesthetists with a high on-call burden appeared to have scores in the higher range in emotional exhaustion and lower range in the overall burnout indicator. In Finland, more than half of the workforce is claimed to be blighted with stress-related symptoms, and 3–7% are severely burned out [26, 36]. In Australia, anaesthetists had lower burnout indices than other specialists [4].

Sick leave and perceived lack of sleep were associated with on-call symptoms and workload. Close to half of the anaesthetists had been on sick leave during the year according to our data and the 1997 study [21]. Worth consideration is that, in 1997, the anaesthetists were among the physicians that had the greatest sick leave frequencies, whereas surgeons had among the smallest frequencies (24%). The association between on-call symptoms and sick leave might reflect the fact that symptoms may be indicators of ill-health, and being on call may be connected to diagnosed diseases.

Both genders slept a mean of 7.0 h. In another Finnish study, good sleepers slept 7.5 and bad sleepers 7.0 h [23]. Only a third of women and a third of those having the heaviest on-call workload had adequate sleep, whereas the figure varies between 65% and 80% among the general population in Finland [37]. Being on call was the greatest reason for the anaesthetists' perceived sleep deprivation. Sleep disturbance was among the most frequently reported stress symptoms. The most important forms of work-related sleep disturbances are known to be insufficient sleep, sleep disorder related to night work, and insomnia due to work stress. Being on call might contribute to all these forms of sleep disturbance at the same time. In Howard *et al.*'s study, residents' daytime sleepiness in both baseline and postcall conditions was comparable to that recorded in clinical sleep disorders [38]. Sleep deprivation causes changes in immunity, metabolism, autonomic nervous system and hormonal function, and is connected to diseases such as type II diabetes, obesity, thyroid dysfunction, arterial hypertension, coronary heart disease, chronic infections and musculoskeletal disorders. It affects cognitive performance, especially planning and

creativity, and makes one prone to mental disorders such as depression, anxiety, aggressiveness, loss of self confidence and suicidal tendencies. It may lead to unhealthy behaviour, such as high alcohol consumption and smoking, and may increase the risk of being involved in an accident [14–18, 23].

A quarter of the respondents in our study had considered suicide. This figure is alarming and significantly higher than among general population (10%), but does not differ from the figures of other physicians [21,27]. Suicidal thoughts were associated with sleep disturbances and other on-call stress symptoms. Other evidence also shows that sleep disturbances might predict suicide risk. Poor sleep quality increased the risk for suicide among depressive patients by 34% [39]. In Finland, suicide (17%) and accidents (11%) were over-represented causes of death among anaesthetists in comparison with other physicians and the general population [9]. Several studies have shown an increased risk of suicide in anaesthetists as compared with other physicians [1, 2, 6, 10]. Some studies indicate that anaesthetists may die 7–13 years younger than other physicians, but the analyses used in these studies have been questioned [3, 11, 40]. However, these studies do not reveal whether the deaths have been caused by mental or physical illness or by accident, and what is the death's relationship to work.

Our study reveals that younger anaesthetists had more on-call symptoms than their older colleagues. One explanation is their higher workload compared with that of older colleagues. In the 1997 study, young physicians had more stress than did their seniors [21, 27]. They indicated workload and lack of skills and consultation possibilities as the most stressing work factors. In a US study, night call was equally stressful for all age groups. Younger anaesthetists were stressed because of economic uncertainty, production pressure, and interpersonal relationships, whereas causes of stress of older colleagues were declining health and physical limitations [13].

Women reported more work-related stress (stress, symptoms, sleep deprivation, sick leave) than did men, which is supported by several studies [4, 36, 41]. The reasons for the gender difference may be in women's double (work and domestic work) or triple (work and domestic work when pregnant) workload [42]. This may also be reflected in the higher ranking of home/work prioritisation by female than male anaesthetists [4]. Women anaesthetists might also have more holistic [43] demands of treating patients than do their counterparts. Recent studies show that sex differences seem to be oestrogen-dependent [41, 44].

A special feature of Finnish anaesthetists is that half of them are women and working full time and having duties as often as men. The female double-triple burden might

reflect the results of the study and explain not only the gender differences in stress response and sleep deprivation but also the unexpected differences in sick leave between surgeons and anaesthetists, as surgeons are still predominantly male. The difference in sick leave can also be linked to lack of professional efficacy. According to the 1997 study, only half of the anaesthetist respondents reported having good professional efficacy, whereas the figure for the surgeons was 74%. In Finland, surgery is the most respected of all professions, whereas anaesthetists have until fairly recently been regarded as the surgeon's assistants. The anaesthetists' professional efficacy has shown to have improved as stated above. However, their time schedule still depends on the schedules of surgeons or other disciplines, lowering their professional control and efficacy. There is evolutionary psycho- and physiological evidence for a positive correlation between one's hierarchical status and serotonin and testosterone levels [45], which might explain why highly respected surgeons suffer less from stress symptoms than anaesthetists. Based on Kivimäki *et al.* [46], the greatest reason for sickness absence among hospital staff in Finland is the workplace atmosphere, which might affect the anaesthetists more, as they are ranked lower than surgeons.

Whereas there is little doubt that physicians work long hours and experience chronic sleep restriction over many years, the consequences for the physician's own health have not been thoroughly studied. Emphasis has been placed upon the impact of physician's sleep deprivation on medical decision making and patient safety [47–50]. In the US, medical error was the sixth leading cause of death nationwide [51]. Neuropsychological deterioration of sleep-deprived physicians has been at the same level as that seen with level of alcohol intoxication [48–50, 52]. Philibert's meta-analysis showed a reduction of cognitive performance after 24–30 h call as equivalent to IQ 70 [53, 54]. Our study showed a correlation between self-reported cognitive and mental disorders, such as memory disturbances, difficulties of understanding speech, falling asleep during activity, exhaustion, irritation, self-destructivity, and being on call.

The well-being of physicians should be seen as in the interest of both physicians and patients. Better-rested physicians might learn and achieve competency faster and be able to make more correct decisions as a result of improved motivation, attention and memory. A meta-analysis showed that working hour limitations may improve the residents' quality of life [19]. In our study, the most important improvement suggestions for the on-call system were shortening the on-call period and diminishing the on-call frequencies.

The overall response rate (60%) was acceptable for a postal survey and compares favourably with other double

mail-out questionnaires. This sample appeared to represent practitioners from all clinical areas including public and private practice of all types. The university hospital anaesthetists were slightly over-represented (51%/41%) and the researchers under-represented when compared with the data of all specialist anaesthetists in 2004. This could be seen as an advantage, as most of the anaesthetists having hospital calls work in university and central hospitals. Of particular interest was that a significant number of practitioners continued working in clinical anaesthesia, having calls well into their late 60s and early 70s (oldest 69 years), unlike other specialists.

There was no manual data assessment for the two lists of perceived symptoms and worries at work. Their calculated reliability coefficients (0.88–0.92) were acceptable for this kind of self-report assessment. The other questions were developed from existing measures. Validity of measurement can be inferred from the correlations between dependent and independent variables. The results of this study agree with previous ones [27] for the parts of overall correlation matrix that can be directly compared, which reflects a relatively good level of validity.

This study confirms that work-related stress and exhaustion is common among Finnish anaesthetists. Being on call is one of the most important perceived causes of their stress, which is in line with the finding that the anaesthetists have the greatest on-call burden among Finnish physicians. Unlike other specialists, they also continue to have an on-call commitment until the age of retirement. Being on call is the greatest reason for their perceived sleep deprivation. Being on call is significantly correlated with various, even severe, stress symptoms. These symptoms are associated with sick leave. Women seem to be more affected by stress than men.

The study shows that interventions are needed to shorten the work period, limit night shifts, and monitor consequences of work-related stress by developing methods for its early detection. A gender-specific study should be carried out on the total daily stress load of anaesthetists to determine the interventions needed to diminish women's perceived stress. There is a need for more awareness about associations between perceived stress, related symptoms, health issues, and sick leave.

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