

Excessive working hours and health complaints among hospital physicians: a study based on a national sample of hospital physicians in Germany

Arbeitszeitbelastung und körperliche Beschwerden: bundesweite Erhebung bei Krankenhausärzten und -ärztinnen im Herbst 2006

Abstract

Objectives: To determine correlations between excessively long working hours and subjectively experienced somatic health complaints among hospital physicians.

Methods: Quantitative data were collected as part of the survey "Working life, Lifestyle and Health of Hospital Physicians in Germany 2006" using self-reporting questionnaires. The individually experienced health was assessed on the basis of Zerssen's [1] list of somatic complaints. The indicator of excessively long working hours was defined as 10 or more working hours per working day and 6 or more on-call shifts a month among full-time employees. The net sample consisted of 3295 randomly selected physicians from 515 hospitals.

Results: The response rate was 58% (n=1917). Physicians with excessively long working hours (19%) had significantly higher sum score of health complaints (p=0.0001) and significantly increased mental and physical fatigue symptoms (feeling faint, languor, uneasiness, heavy legs, excessive need for sleep, trembling; p=0.0001 to 0.047), mood changes (irritability, brooding; p=0.008 to 0.014), gastrointestinal (nausea, loss of weight; p=0.0001 to 0.014) and heart disorders (lumpy sensation in the throat, chest pain; p=0.0001 to 0.042). When the sum score of health complaints was controlled for selected confounders, being female (B=-3.44, p=0.0001) and having excessively long working hours (B=2.76, p=0.0001) were significantly correlated with health complaints. In a separate gender analysis, being exposed to excessively long working hours remained a significant predictor for health complaints among both females (B=3.78, p=0.001) and males (B=2.28, p=0.004).

Conclusions: Excessively long working hours are associated with an increased risk of health complaints. Reducing working hours may be the first step to improving physicians' health.

Keywords: working hours, health complaints, hospital physicians, Germany

Zusammenfassung

Zielsetzung: Gegenstand der Studie war die Analyse eines Zusammenhangs zwischen Arbeitszeitbelastung und körperlichen Beschwerden bei Krankenhausärzten in Deutschland.

Methoden: Die Daten zur Arbeitszeit (Dauer eines durchschnittlichen Arbeitstages und die Anzahl der Bereitschaftsdienste im Monat) und körperlichen Beschwerden anhand der Skala von Zerssen [1] wurden im Rahmen der schriftlichen Repräsentativerhebung zu „Arbeit, Gesundheit und Gesundheitsverhalten der Ärzte und Ärztinnen 2006“ erhoben. Eine Arbeitszeitbelastung wurde als Vollzeitbeschäftigung, Arbeitstag von 10 oder mehr Stunden und die Ableistung von 6 oder mehr Bereit-

Judith Rosta¹
Andreas Gerber²

1 Federal Institute for
Population Research,
Wiesbaden, Germany

2 Institute for Health
Economics and Clinical
Epidemiology (IGKE),
University of Cologne,
Cologne, Germany

schaftsdiensten im Monat definiert. Die Nettostichprobe umfasste 3295 Ärzten aus 515 Krankenhäusern.

Ergebnisse: Die Rücklaufquote lag bei 58% (n=1917). Personen mit deutlicher Arbeitszeitbelastung (19%) hatten eine signifikant höhere Gesamtzahl an körperlichen Beschwerden (p=0,0001) und litten signifikant häufiger an mentaler und körperlicher Erschöpfung (p=0,0001 bis 0,047; Schwächegefühl, Mattigkeit, Unruhe, Schweregefühl in den Beinen, übermäßiges Schlafbedürfnis, Zittern), Stimmungsschwankungen (Reizbarkeit, Grübeleien), gastrointestinalen Beschwerden (p=0,0001 bis 0,014; Gewichtsabnahme, Übelkeit) und Herzbeschwerden (p=0,0001 bis 0,042; Stiche in der Brust, Kloßgefühl im Hals). Die Gesamtzahl körperlicher Beschwerden korrelierte signifikant mit einer deutlichen Arbeitszeitbelastung (B=2,76, p=0,0001) und dem weiblichen Geschlecht (B=-3,44; p=0,0001). In separater Analyse nach Geschlechtern blieb die deutliche Arbeitszeitbelastung ein signifikanter Prädiktor für körperliche Beschwerden bei Ärztinnen (B=3,78, p=0,001) und Ärzten (B=2,28, p=0,004).

Schlussfolgerung: Eine deutliche Arbeitszeitbelastung korreliert signifikant mit körperlichen Beschwerden. Eine Reduzierung der Arbeitszeit dürfte der erste Schritt sein, die Gesundheit der Ärzte zu verbessern.

Schlüsselwörter: Arbeitszeit, Ärzte, Krankenhaus, Gesundheit

Introduction

Working outside normal hours, as a result of extended day and night shifts, is a world-wide phenomenon within the medical profession [2], [3]. Evidence of excessively long working days among physicians in Germany can be seen from the wave of strikes undertaken by German hospital physicians in the years 2005 and 2006 to achieve better working conditions, including working hours [4], the results of a number of pilot projects conducted in selected cities or counties [5], [6], [7], and the latest representative survey. The latter indicated that physicians, with a full time position in which they regularly work at night, put in an average working day of 9.9 hours, in addition to 6.6 on-call shifts a month [8]. This is equivalent to about 63 working hours or more per week and is, consequently, obviously not in compliance with the European Working Time Directives which allow a maximum working week of up to 58 hours for physicians [9]. The regulation of working hours is required for health and safety reasons [10]. From population studies that have been undertaken, it is well-known that people who work excessively long days generally report a lower level of perceived general health, increased rates of injury, increased psycho-vegetative and muscular disorders [11], are generally more frequently ill [12], [13], [14], [15], [16], [17], [18], [19], are likely to engage in more risky health behaviour [13], [14], [20], [21], and even have a higher mortality rate [22].

Although there is evidence to indicate that long working days can adversely affect health, and that physicians have extended working days, research on the relationship between these issues is rare and has been limited to a

specific position, certain specialties or to a limited range of health complaints such as fatigue [23], [24], [25], individual injuries, somnolence [26] and the negative effect of a lack of sleep on a person's mood [27], [28]. Despite these important findings, we still know very little about the connection between extended working hours and a number of somatic health complaints among physicians. Yet, it is obvious that the stability of the entire health care system stands or falls with the health of its physicians since, for example, healthy physicians have a favourable impact on the quality of health care and the relationship among colleagues [29], [30], [31], [32].

Working on the assumption that long working hours are the rule among hospital physicians and that extended working hours are associated with several health complaints, the present study analyses the correlations between excessively long working hours and the potential impact on the health of a nationwide representative sample of hospital physicians in Germany.

Materials and methods

Procedure and study population

The data sampling was commissioned by the German Hospital Institute (<http://www.dki.de>), which has many years of experience in the area of hospital surveys. A random sample, representative of all physicians working in hospitals with a 100 or more beds, was used. As a first step, a random sample of hospitals was drawn and, as a second step, a random sample of physicians. The net sample consisted of 3295 randomly selected physicians from 515 hospitals [8].

Data collection was carried out between September and October 2006, by means of a one-wave mail survey. The survey was anonymous. To increase the response rate, a recommendation from the German hospital physicians' union – the Marburger Bund (<http://www.marburgerbund.de>) – was enclosed with the accompanying letter and also publicized on the union's homepage. Moreover, the sponsor (the German Research Foundation, <http://www.dfg.de>) and the agency responsible for handling and analysing the data (the Federal Institute for Population Research at the Federal Statistical Office, <http://www.bib-demographie.de>) were explicitly mentioned on the cover sheet of the questionnaires as these institutions are known for their independence.

Variables

The final questionnaire consisted of 12 pages, with several items regarding health, life style, working conditions (including working time), and demographics. Working time was evaluated by means of questions pertaining to the actual number of hours worked per day (including overwork) and the number of days per month spent doing on-call duty, both on weekdays and on weekends. The questionnaire was pre-tested on 20 physicians from three hospitals using written (n=16 of 30) and cognitive question testing (n=4 of 4) for comprehension and clarity. The questionnaire was subsequently revised on the basis of their feedback.

The diagnosis of somatisation disorders was approached with the aid of the Zerssen [1] symptom checklist, which is a validated [33] instrument for measuring actual somatic complaints. The symptom checklist consists of 24 items and asks for actually perceived general and somatic complaints. The intensity of the complaints was assessed on a four-grade Likert scale (not at all=0, not much=1, moderate=2, severe=3). The items essentially characterize common complaints or physically identifiable complaints and, consequently, complaints which fall within the scope of general practitioners and internists. The resulting scores may be used as dichotomous responses (0 and 1 versus 2 and 3). The questions also allow for the calculation of a sum score and thus offer a picture of the current overall impairment of the subjective feeling of well-being [1].

Statistical analysis

First, the data on working hours per day, the number of on-call shifts per month, and the percentage of excessive working hours were descriptively displayed, so as to provide an overview. A working day of 10 or more working hours and 6 or more on-call shifts a month, in the case of full-time employees, was used as an indicator of excessively long working hours. These criteria are in line with the definition contained in the 'Fourth European Working Conditions Survey' [34], which defines long working hours as working approximately 10 hours a day. Furthermore, this definition also complies with the

agreement on tariffs for physicians, which does not permit more than 6 on-call shifts per month (BAT, SR 2c).

Secondly, several health complaints were analysed in relation to groups subject to and not subject to excessively long working hours. For the purpose of these analyses, several health complaints were dichotomized into groups of "no health complaints" (none at all, not many) and "health complaints" (moderate, severe).

In a third phase, the sum score of the health complaints was compared for the two groups – those subject to and those not subject to excessively long working hours. Finally, the sum score of the health complaints was controlled for some variables such as gender, age and excessively long working hours.

The analysis involved the Pearson χ^2 test for categorical data, analysis of variance for the comparison of group means, and regression models to investigate multivariate effects. The statistical Package for Social Science [35] software, Windows Version 13, was used to analyse the data. Significance was accepted at statistical differences at Alpha=0.05.

Results

The response rate was 58% (n=1917). The majority of physicians was male (61%), younger than 45 years of age (79%), worked as interns or board-certified physicians (71%) (i.e. no chief physicians or heads of department), worked full-time (89%) and had regular on-call duty (71%) [8].

Table 1 displays some data collected on working time: Nearly every second physician worked 10 or more hours on an average working day and was on on-call duty up to 6 or more times per month. In total, every fifth physician was affected by excessively long working hours.

Table 1: Length of working day, average on-call duty per month, and share of physicians with excessively long working hours (%)

All hospital physicians*	% (n)
Working hours per day (n=1903)	
<9.0	20.9 (398)
9.0-9.9	30.9 (589)
≥10	48.1 (916)
On-call duties per month (n=1906)	
0	29.3 (558)
1-5	22.6 (430)
≥6	48.2 (918)
Excessively long working hours** (n=1891)	
Yes	19.0 (360)

* including part-time work

** ≥10 working hours per day and ≥6 on-call duties per month by full-time employees

Table 2: Prevalence of self-reported health complaints among physicians working and those not working excessively long hours (Pearsons' Chi-Quadrat)

Health complaints (n=1871-1884)*	Prevalence of health complaints concerning excessively long working hours (%)		
	No	Yes	P-value
Lumpy sensation in the throat	5.7	8.6	0.042
Shortness of breath	5.8	7.5	0.221
Feeling faint	15.7	23.0	0.001
Dysphagia	2.8	3.1	0.800
Chest pain	42.5	54.0	0.0001
Feeling of fullness	21.8	25.3	0.161
Languor	42.5	54.0	0.0001
Nausea	4.3	7.5	0.012
Heartburn	19.1	22.1	0.188
Irritability	49.0	56.8	0.008
Brooding	41.5	48.6	0.014
Sweating	15.4	17.0	0.444
Backache	46.9	46.1	0.794
Uneasiness	29.6	35.0	0.047
Heavy legs	23.8	32.3	0.001
Restless legs	8.6	10.9	0.161
Thermal hypersensitivity	9.4	9.2	0.921
Hypersensitivity to cold	13.2	13.9	0.703
Excessive need for sleep	41.4	53.1	0.0001
Somnipathy	31.8	35.9	0.131
Dizziness	5.6	7.5	0.163
Trembling	3.3	6.7	0.003
Pain in the neck or shoulder	40.5	44.2	0.201
Loss of weight	5.1	11.7	0.0001

* Different levels of n due to different response to questions

Table 3: Means of sum scores of Zerssen's list of somatic complaints among the two groups of physicians working vs. not working excessively long hours (ANOVA)

Working excessively long working hours (n=1817)	Means	SD	F	P-value
No	15.96	10.49	14.53	0.0001
Yes	18.41	11.75		

The prevalence of self-reported health complaints among physicians subject or not subject to excessively long working hours is shown in Table 2. Physicians with excessively long working hours reported the following health complaints with significant frequency: feeling faint, a lumpy sensation in the throat, chest pain, languor, nausea, irritability, brooding, uneasiness, heavy legs, excessive need for sleep, trembling, and loss of weight.

Table 3 shows the significantly higher sum score among physicians with excessively long working hours. As can be seen in Table 4, being female and working excessively long hours are factors which have a significantly positive correlation to the sum scores of health complaints. In separate gender analyses, working excessively long hours remains a significant predictor for both men and women. Age has no influence on these models.

Table 4: Linear regression analyses of sum scores of Zerssen's list of somatic complaints among all physicians and in subgroups female vs. male physicians

	B	Beta	T	P-value
All Physicians (n=1814)				
Working excessively long working hours*	2.761	0.100	4.279	0.0001
Gender**	-3.443	-0.1555	-6.576	0.0001
Age***	-0.474	-0.021	-0.906	0.365
Male Physicians (n=1112)				
Working excessively long working hours*	2.278	0.088	2.922	0.004
Age***	-0.366	-0.017	-0.572	0.568
Female Physicians (n=702)				
Working excessively long working hours*	3.777	0.125	3.297	0.001
Age***	-0.694	-0.029	-0.767	0.443

* Working excessively long working hours: No=0, Yes=1

** Gender: Female=0, Male=1

*** Age: <40=0, ≥40=1

Discussion

The present study is the first to examine the impact of excessively long working hours on health, among a representative sample of hospital physicians in Germany. The most significant finding is that a positive correlation exists between excessively long working hours and general health, as well as health complaints including: mental and physical fatigue, gastrointestinal and heart disorders. 'Working time overload' is a genuine burden for hospital physicians. Only a minority work less than nine hours per working day and have less than six on-call shifts per month. Every fifth hospital physician bears the double burden of consistently long working days (ten hours or more) as well as very frequent on-call shifts (six or more per month), amounting to an average working week of 63 hours or more.

Extended hours and night shifts have also long been customary in other Western countries, as is documented by working weeks of 60 hours in England [3] or 85 hours in the US [2]. What is remarkable is that hospital physicians, themselves, show a positive attitude towards a longer than average working day, if it is combined with a longer rest period [36]. Even the laws of the European Union are consistent with physicians' apparently higher tolerance of working time overload and allow working hours of up to 58 hours a week over a seven-day period, as opposed to the 48 hours per seven-day week that applies to the rest of the working population. A 48-hour week for physicians is not likely to come into force before 2009-2012 [9], [10]. Nevertheless, a population-based review has documented that even those employees who favour extended hours still run the risk of seeming fatigued at the end of a working day and tend to experience health disorders in the long run [37].

Indeed, frequent overtime and on-call shifts are commonly known to be tiring. Night work and long hours, with irregular and unpredictable work schedules, can at times be so excessive as to seriously restrict the time available for recovery and sleep [13], [38]. Not surprisingly, most investigations among selected medical professional groups have documented positive correlations between work

scheduling, fatigue [24], [39], sleep deprivation, and the negative effect of sleep loss on a person's mood [28], [40].

As expected, we found similar correlations in our study. Feelings of irritability, uneasiness and brooding were significantly associated with physicians working excessively long hours. Moreover, most of the significant health complaints among physicians working excessively long hours can be classified as typical fatigue symptoms. However, in contrast to these earlier investigations, the present study has documented fatigue that has already shown negative effects on both physical and mental health, such as: feeling faint, languor, uneasiness, heavy legs, excessive need of sleep and trembling. Other noticeable findings in our study relate to evidence for long-term effects of working time overload such as cardiovascular and gastrointestinal disorders [11], [12], [13], [41], [42], [43] that may be expressed as symptoms such as a lumpy sensation in the throat, chest pain as well as nausea and loss of weight among physicians. All of these symptoms could be seen as consequences of a continuous and permanent working time overload among hospital physicians.

In general, hospital physicians clocking excessively long working hours were likely to fall prey to somatic and general complaints to a significantly higher degree than those who did not. However, the former do not by any means constitute a homogeneous group when it comes to the types of health complaints. After controlling the overall health status for a number of confounding variables, excessively long working hours still remained highly significant. The reason why female physicians, despite having a lower burden in terms of working time [8], report having a significantly higher incidence of health complaints, is documented by a large body of empirical evidence. It can be consistently shown that women over-report symptoms [44], [45]. It is assumed that the 'sick role' may be more socially acceptable to them and, in consequence, they may be more willing to define physical changes in terms of ill health [46]. This could be the case in our sample although, as medical professionals, both female and male physicians should be using the same

knowledge-base in describing symptoms or somatic disorders. Similar trends were found in a study of Norwegian physicians, which reported a higher frequency of somatic complaints among female as opposed to male physicians [47].

For the interpretation of the present health complaints, the role played by stress should also be taken into account. Many studies have documented higher stress levels among physicians and medical students [48], [49] than in other workers [50]. In professions such as medicine, where physicians have to face long hours including 'work overload', excessively long working hours have been identified as a significant source of stress [39], [51], [52], [53], [54]. Furthermore, stress, fatigue symptoms and psychosomatic reactions are important signs of burnout syndrome [55], [56], a phenomenon that continues to be a major problem among physicians. The research to date seems to implicate extended working hours as the reason for burnout among physicians [57], [58], [59]. This may also be the case in our sample. The group of physicians working excessively long hours showed evidence of potential burnout syndrome in terms of profound fatigue and manifest physical symptoms. Therefore, if one accepts that long hours may contribute, directly or indirectly, to occupational stress and burnout, then the 'reduction of working hours' should be the key words for policy makers who care to see effective prevention also provided for physicians.

The current situation in Germany does not benefit hospital-based physicians. In the first place, neither sufficient nor effective efforts are being undertaken to monitor the implementation of the working time directives [60], [61]. Secondly, there is widespread controversy about the unlimited time-frame for the implementation of a 48-hour week for physicians [62] as well as about observing the rulings handed down by the European Court [63], [64] classifying on-call duty as actual working hours [65]. From the practical point of view, limiting hospital physicians' working hours is essential. Reduced working hours would not only be a positive incentive for physicians to remain in the profession, but will also improve their social well-being [66], [67], work satisfaction [68], the quality of patients' care [39] and, last but not least, the physicians' own physical and mental health.

As with all studies, this report has its limitations as well as its strengths. The study's main strength is that it was the first comprehensive, nation-wide survey of German physicians' working conditions, health and life-style. Similar, but rather more limited studies have recently been conducted in selected counties, cities or hospitals [7], [69], [70], [71], [72]. Furthermore, the response rate of 58%, albeit less than optimal, was much better in comparison with previous surveys of physicians in Germany, which had response rates of between 17% and 51% [7], [69], [70], [71], [72]. Admittedly, studies on physicians' health from Norway [73], the US [51] and the UK [73] had higher response rates than those achieved here. However, the experience of recent years showed that the general willingness among the German popula-

tion to participate in studies of this ilk, is the lowest of all the EU countries [74]. However, one reason for the lack of response on the part of physicians, could be that they did not find time to complete the questionnaire. Another concern is that a possible selection bias could be attributed to the content of the questions – working conditions, health and life-style. Physicians with an unhealthy life-style might be reluctant to participate out of concern that they might be identified. This would result in an underestimation of health complaints. If we consider the positive relationship between more risky health behaviours and overtime [13], [14], [20], [21], then the underestimation of reported health complaints could be even greater in this study. We should also mention here that the Zerssen symptom checklist can not provide exact informations about actual physical diseases, but it is qualified for characterizing physically identifiable complaints and linking them to possible health hazards [1]. Further limitations comprise a lack of some intermediate variables such as coping, other workplace hazards and employers' policies regarding overtime – all of which could affect the relationship between overtime and health [16]. Moreover, some evidence exists to suggest a connection between marriage, health and stress. Research shows that married couples tend, on average, to be healthier [75], [76] because they are better equipped, as a team, to handle stress than are single persons [77]. Whether married physicians have a tendency to enjoy better health than their single colleagues, still remains to be answered adequately. Furthermore, the restriction of the study to those physicians currently working in a hospital setting might have distorted the picture, as it does not include physicians who had already left their jobs due to excessive scheduling demands or health conditions that precluded their continuing to work such schedules. At present, in Germany, there is an increased brain drain of physicians to other professions and to foreign countries – mainly because of extended work schedules and excessive working hours [7], [78], [79]. Therefore, it would be useful to collect data on those hospital physicians who left their profession and compare them to data from physicians still working in the medical profession. On the other hand, it would also be of interest and of critical importance to compare countries and examine how work-related factors, other than hours – for example hierarchical hospital structures, salary levels, job status and the quality of professional training – contribute to physicians' health complaints. For example, like in Germany [7], [8], many hospital physicians in Great Britain [3] have working weeks of 60 hours or more. Nevertheless, a growing number of German physicians are emigrating to Great Britain [79], attracted by a range of factors including: personal rewards, systematic and supervised postgraduate training, better working conditions and pay, as well as opportunities for professional development [80]. Finally, because overtime practices and the quantity of overtime worked vary enormously from specialty to specialty, and also among practitioners within each specialty

[8], it would also be important to analyse these relationships.

Looking to the future, gaining further insight into this subject on an international level could prove very useful in devising strategies aimed at improving doctors' health on a national and international level. However, as prevention and health promotion enjoy a very privileged status in medicine, a primary measure would be to limit working time to 48 hours per week (including on-call and stand-by duty) before other measures are introduced.

Notes

Conflicts of interest

None declared.

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Remarks

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Corresponding author:

Judith Rosta, PhD

Federal Institute for Population Research at the Federal Statistical Office, Friedrich-Ebert-Allee 4, 65180 Wiesbaden, Germany, Fax: +49-(0)611-75 3960
judith.rosta@destatis.de

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