

## ORIGINAL ARTICLE

# Psychosocial Stress Among Hospital Doctors in Surgical Fields

Results of a Nationwide Survey in Germany

Olaf von dem Knesebeck, Jens Klein, Kirstin Grosse Frie, Karl Blum, Johannes Siegrist

## SUMMARY

**Background:** The aim of this paper is to analyze psychosocial stress in the workplace among hospital doctors working in surgical fields in Germany with the aid of the demand-control model, the effort-reward imbalance model, and selected additional indicators.

**Methods:** A written questionnaire was answered by a stratified random sample consisting of 1311 hospital doctors working in surgical fields in 489 hospitals in Germany. Validated instruments were used to make measurements according to the demand-control and effort-reward imbalance models.

**Results:** The working conditions of about a quarter of the hospital doctors surveyed were characterized by an effort-reward imbalance. 22% of them have “job strain” according to the demand-control model, i.e., they are confronted with high demands, yet have a low degree of control. Residents and assistant physicians not occupying training positions were both found to have an especially high degree of psychosocial stress. Furthermore, about one-fifth of the hospital doctors surveyed thought about giving up their profession at least a few times per month. 44% of them considered that the quality of patient care was sometimes or often impaired by an excessive physician workload.

**Conclusion:** An investigation of psychosocial stress in the workplace among hospital doctors in surgical fields in Germany indicates that this group suffers from more severe stress at work than other occupational groups. Such working conditions pose a threat to these physicians’ own health and to the quality of the health care that they provide.

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Institut für Medizin-Soziologie, Universitätsklinikum Hamburg-Eppendorf:  
Prof. Dr. phil. von dem Knesebeck, M.A. Klein, M.A. Grosse Frie

Deutsches Krankenhausinstitut Düsseldorf: Dr. P. H. Blum

Institut für Medizin-Soziologie, Heinrich Heine Universität Düsseldorf:  
Prof. Dr. phil. Siegrist

**W**orking conditions for hospital personnel in Germany are characterized by increasing patient numbers and shorter stays (1). In light of this, psychosocial stress and its consequences among hospital doctors have been subject to increasing scientific scrutiny and greater public awareness in recent years (2–5). Hospital doctors in surgical specialties appear to suffer particularly high levels of stress (6, 7). There are, however, very few studies of this group in Germany that permit generalizations to be made and that are based on current theoretical models for collecting data about psychosocial stress. This evidence gap provides the context for a study of the situation in Germany for hospital doctors in surgical specialties.

In this study two established models provide a theoretical foundation and are used to determine the level of psychosocial stress:

- The demand-control model (8) highlights two critical characteristics of working conditions: the demands that are placed on the employee, and the range of opportunities for control, or latitude in decision making, which the employee has when carrying out his or her job. Work that is characterized by a combination (quantitative) of high demands and low decision latitude may induce chronic distress (job strain).
- The foundations of the occupational effort-reward imbalance model (9) are the contractual working conditions, which are based on the norm of social reciprocity. It is postulated that this norm is violated, for example, when an extraordinary effort at work does not receive adequate rewards. Occupational rewards include money, esteem and recognition, career prospects, and job security. The model is expanded by the intrinsic components of the tendency towards excessive work-related overcommitment. This is a motivational pattern that is characterized by an unrealistic assessment of demand and reward and may increase psychosocial stress further.

The aim of the current study is to describe the extent of psychosocial stress in hospital doctors in surgical specialties in Germany using the two models outlined above and selected additional indicators. Correlations between sociodemographic (gender) and professional

and workplace-related characteristics (position and department) are also shown.

### Method

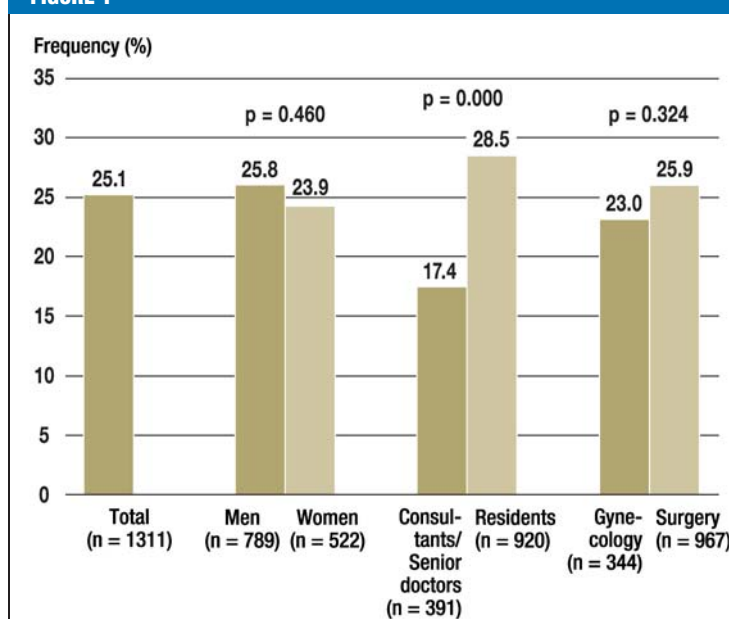
The population surveyed in Germany in 2008 included all employed doctors in general hospitals with more than 100 beds with a department of surgery and/or gynecology or obstetrics. The selection was made using disproportionate stratified random sampling with two strata (hospital and physician) so that larger hospitals with a larger number of doctors are adequately represented. All hospitals with 300 beds or more were therefore included in the study (census), whereas hospitals with fewer than 300 beds were randomly sampled. Three doctors per department were randomly selected in each hospital with fewer than 600 beds, and nine per department from larger units, where significantly more doctors work. The hospitals are categorized using the classification normally used by the German Hospital Institute. A total of 922 hospitals (681 with surgical and 241 with gynecological departments) were selected. This corresponds to a random sample of 3648 doctors. The proportion of doctors in surgical and gynecological departments corresponded approximately with that of the background population.

The authors wrote to the medical director of each unit, requesting that the questionnaire be passed on to three, or nine doctors (depending on the size of the hospital). The standardized written questionnaire was completed by 1311 hospital doctors from 489 hospitals, representing a participation rate of 53% of the 922 hospitals contacted. 36% of the 3648 background population of doctors responded to the questionnaires. The response rate of the doctors in the participating hospitals was 65%.

The questionnaire for measuring job effort-reward imbalance (10), which has been psychometrically tested in numerous studies, contains six items about effort. Ten items, comprising the three subscales esteem (four items), salary/career prospects (four items), and job security (two items), refer to the reward. The responses were recorded using a 5-point Likert scale representing the extent of perceived stress, and summated for analysis. Siegrist developed an effort-reward quotient to enable the degree of psychosocial stress to be expressed as a numerical value, with a value over one indicating an effort-reward imbalance (10). The degree of work overcommitment was determined using six items, with respondents expressing the extent of their agreement with various statements using a 5-point scale.

Data for the demand-control model was collected using the 16-item version of the Job Content Questionnaire (11, 12), which has been widely validated. Demand and control were examined using eight items each in a four-step response scale from “strongly agree” to “strongly disagree”. The values of these items were also summated. By splitting the median of the two components demand and control, the doctors were grouped in accordance with the model requirements.

FIGURE 1



Frequency (%) of occupational effort-reward imbalance (quotient >1) for hospital doctors in surgical specialties by sex, position, and department; chi-square test for significance testing

The group whose members suffered chronic distress or job strain, that is, those subject to high demands with simultaneous low control, were of particular interest.

As well as both these models, additional indicators of work stress or the consequences were determined. This includes two items we developed that deal with the shift of stress from work to private life. The extent to which occupational stress had a negative impact on family or personal interests was captured in detail. In this case the doctors surveyed also had the option of answering the questions on a 4-point scale. The doctors were also asked how often in the preceding 12 months they had thought of giving up their profession or of working abroad because of local working conditions (1 = never, 2 = several times a year, 3 = several times a month, 4 = several times a week, 5 = every day). Furthermore, using a self-developed 4-step scale (1 = never, 2 = rarely, 3 = sometimes, 4 = often) we determined how often overwork and time pressure had a negative effect on the quality of patient care.

Cross tabulation and logistic regressions were calculated for the correlation analysis. The data on psychosocial stress are not normally distributed, so non-parametric tests (Mann-Whitney U test) were used for the comparisons of the means. All analyses were done using the statistics program SPSS 15.0.

### Results

Figure 1 shows that about a quarter of hospital doctors in surgical specialties suffer from effort-reward imbalance, that is, a mismatch between effort and reward. The prevalence among residents and junior doctors without training positions is significantly higher than

**TABLE 1**

Psychosocial stress in hospital doctors in surgical specialties by sex, position and department

	Total (N=1311)	Sex		p <sup>*1</sup>	Position		p <sup>*1</sup>	Department		p <sup>*1</sup>
		Male (n=789)	Female (n=522)		Consultant/ Senior physician (n=391)	Resident <sup>*2</sup> (n=920)		Gynecology/ Obstetrics (n=344)	(General) surgery (n=967)	
Effort-reward imbalance model										
— Quotient effort/reward (M, SD)	0.87 (0.37)	0.88 (0.39)	0.86 (0.32)	0.957	0.79 (0.27)	0.91 (0.39)	<0.001	0.84 (0.33)	0.88 (0.38)	0.099
— Effort (sum scale: M, SD)	18.5 (3.8)	18.6 (3.9)	18.4 (3.7)	0.271	18.5 (3.7)	18.5 (3.8)	10.637	18.4 (4.0)	18.6 (3.7)	0.405
— Reward (sum scale: M, SD)	38.3 (7.5)	38.5 (7.6)	38.2 (7.3)	0.636	41.3 (6.3)	37.1 (7.6)	<0.001	39.0 (7.0)	38.1 (7.7)	0.013
— Salary (sum scale: M, SD)	13.6 (4.2)	13.5 (4.3)	13.6 (4.0)	0.744	15.7 (3.4)	12.6 (4.1)	<0.001	14.4 (3.7)	13.3 (4.3)	<0.001
— Esteem (sum scale: M, SD)	16.8 (3.3)	16.9 (3.2)	16.6 (3.4)	0.315	17.3 (3.0)	16.6 (3.4)	<0.001	16.7 (3.3)	16.8 (3.3)	0.718
— Job security (sum scale: M, SD)	8.0 (1.9)	8.0 (1.9)	8.1 (1.9)	0.133	8.2 (1.8)	8.0 (1.9)	0.103	8.0 (2.0)	8.0 (1.9)	0.292
— Tendency to professional overcommitment (sum scale: M, SD)	15.7 (3.7)	15.6 (3.8)	16.0 (3.6)	0.108	16.1 (3.5)	15.6 (3.7)	0.007	15.9 (3.7)	15.7 (3.7)	0.405
Demand-control model										
— Demand (sum scale: M, SD)	24.7 (3.7)	24.9 (3.7)	24.6 (3.6)	0.091	24.2 (3.6)	25.0 (3.7)	<0.001	24.2 (3.7)	24.9 (3.6)	< 0.001
— Control (sum scale: M, SD)	26.0 (3.6)	26.5 (3.6)	25.2 (3.4)	<0.001	28.3 (2.7)	25.0 (3.4)	<0.001	25.3 (3.7)	26.2 (3.5)	0.001
Due to professional demands, too tired for										
— activities with the family (%)	72.1	72.2	72.1	0.962	68.5	73.7	0.058	74.4	71.3	0.261
— personal interests (%)	79.6	77.5	82.6	0.025	72.9	82.4	<0.001	82.3	78.5	0.136
In the last 12 months several times a month or more thought of										
— giving up the job (%)	20.7	20.6	20.8	0.504	18.9	21.5	0.163	21.5	20.4	0.357
— working abroad (%)	30.5	33.1	26.7	0.009	17.1	36.2	0.001	23.3	33.0	< 0.001
Quality of patient care sometimes or often negatively affected by										
— overwork (%)	44.2	41.7	48.0	0.015	35.0	48.0	<0.001	46.6	43.3	0.162
— time pressure (%)	67.2	63.8	72.4	0.001	54.1	72.8	<0.001	69.8	66.3	0.131

\*1Significance testing using chi-square test or Mann-Whitney U test, not adjusted for multiple testing; \*2 Residents and junior doctors without training positions; M, mean; SD, standard deviation

among senior doctors and consultants, whereas there were only minor differences for gender and department (gynecology/obstetrics versus surgery). If the individual dimensions of the effort-reward imbalance model are considered (Table 1), it becomes clear that junior doctors show lower values only for rewards, particularly the perceived adequacy of salary and esteem/recognition, compared to their more senior colleagues. On the other hand, consultants and senior doctors tend towards work overcommitment.

More than 22% of hospital doctors have job strain according to the demand-control model (Figure 2), that is, they are confronted with high demands yet have a low degree of control. Of those with job strain, the proportion of women compared to men and of junior doctors compared to consultants and senior doctors is higher. This is predominantly due to women and junior doctors assessing treatment and decision latitude

(control) in their work as being significantly lower (Table 1). Hospital doctors from surgery show both higher demand values and control values, meaning that in terms of the combination of both dimensions (job strain) there are only minor differences compared to gynecologists/obstetricians.

Seventy-two percent of doctors surveyed indicated that their jobs place them under such strain that they are too tired for activities with their partner or children. Just under 80% are so exhausted by occupational demands that they are unable to devote themselves to their personal interests. Women and junior doctors in particular often complained about the shift of occupational strain to the private sphere.

About one-fifth of the hospital doctors in surgical specialties surveyed had thought about giving up their profession several times a month or more frequently. Even more doctors (about one-third of those surveyed)

had thought about working abroad several times a month or more frequently because of the local working conditions. This was particularly common among male doctors, junior doctors, and surgeons. About 44% of doctors surveyed considered that the quality of patient care was sometimes or often impaired by an excessive workload. About two-thirds estimated that time pressure sometimes or often reduces the quality of care provided. These impairments were more commonly observed by women and junior doctors.

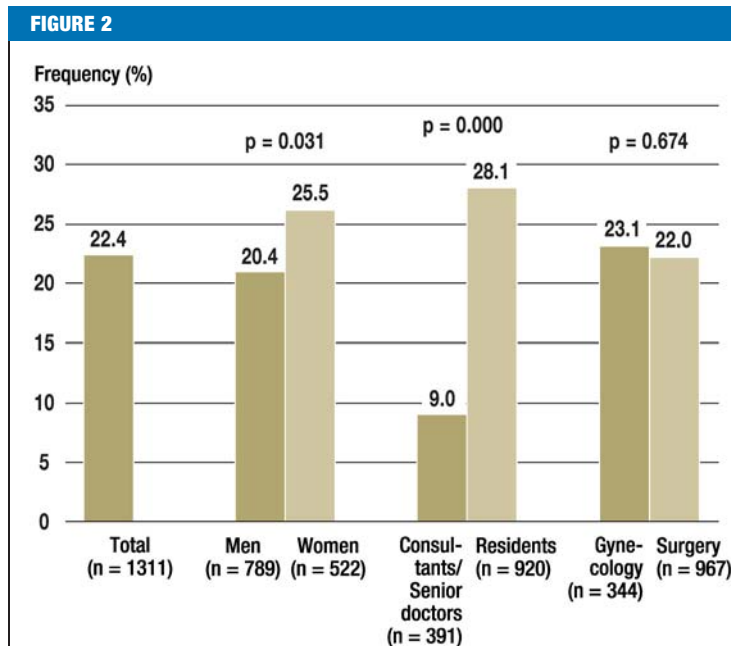
Table 2 shows the correlation between the two models of psychosocial stress in the workplace and the data about professional plans and quality of patient care using logistic regression analyses. Hospital doctors working in surgical specialties with increased psychosocial stress are significantly more likely to think of giving up their job or working abroad several times a month or more frequently over the last year. These doctors also indicate more frequently that the quality of their patient care is impaired by overwork or time pressure.

### Discussion

Using the demand-control (8) and effort-reward imbalance (9) models, it becomes clear that hospital doctors in surgical specialties are highly stressed compared to the German work force in general (12–14). The mean of the quotients for effort and reward in the overall work force is between 0.5 (12) and 0.6 (13), for primary care physicians about 0.8 (14) and for hospital doctors in surgical specialties about 0.9 (Table 1). A comparison of the results of the current study with studies from other countries that were also carried out with doctors shows that overall there were similarly high stress values (14–18). Stress is often associated with aspects of family and private life, with plans for future career paths, and the perceived quality of patient care. Residents and junior doctors without training positions were found to have an especially high degree of psychosocial stress. Gender-specific differences also emerged with higher, although variable, stress values for women. It must be noted that women are overrepresented among residents. Occasionally there were differences between gynecology/obstetrics and surgery but no clear pattern was found. Stress experienced in larger hospitals was also more pronounced than in smaller hospitals (not shown in Results section).

Both stress theory models cited assume psychosocial stress has an increased adverse effect on health. This assumption has been validated for both models for various health indicators and diseases in Germany and internationally in both cross-sectional and prospective studies (10, 16, 19, 20). Thus, it can be assumed that the work of hospital doctors in surgical specialties increases the risk of psychosocial stress as well as the subsequent negative impacts on health (21).

Greater clarification is needed to determine whether the significant differences between residents and junior doctors without training positions on one hand and consultants and senior doctors on the other can be traced



Frequency (%) of job strain in accordance with the demand-control model for hospital doctors in surgical specialties by sex, position, and department; chi-square test for significance testing

back to position or cohort effects. If it is a position effect, it would be expected that the stress would decline over the course of a medical career. Such an effect can also be found in the effort-reward imbalance model (9). As a consequence, high costs offset with low gains are accepted for strategic reasons, because better chances for future professional advancement are expected from such preparatory efforts. It is also plausible, however, that it is a cohort effect, meaning that current residents feel more stressed because of their working conditions than residents have in the past. This would mean that these doctors will also feel more stressed in future, regardless of their position. Longitudinal data are necessary to clarify what roles position and cohort effects play in the differences found.

### Implications

In terms of health care policy, the finding that there is a correlation between psychosocial stress and subjective perceptions of the quality of patient care is particularly important. Many hospital doctors indicate that factors such as overwork or time pressure often negatively affect the quality of care. Until now, such a correlation has been systematically examined in only a few studies (22–25). A reason for this deficiency in the research may be due to the complex methodological designs needed for such a study. The results documented here for the possible ramifications of job stress on patient care must be considered in light of the methodological limitations (see below). The results nevertheless indicate that a greater focus on patients and the best possible quality of care are linked to an improvement in working conditions for hospital personnel. Such

**TABLE 2**

Psychosocial stress, professional plans and perceived quality of patient care: results from eight multiple logistic regression analyses

	Frequently thought of giving up the job		Frequently thought of working abroad		Patient care frequently affected by overwork		Patient care frequently affected by time pressure	
	Yes N (%)	Odds Ratio* [95% CI]	Yes N (%)	Odds Ratio* [95% CI]	Yes N (%)	Odds Ratio* [95% CI]	Yes N (%)	Odds Ratio* [95% CI]
Job effort-reward imbalance (Quotient >1)								
Yes	127 (42.1)	4.37 [3.25–5.89]	142 (47.0)	2.60 [1.96–3.45]	185 (61.5)	2.42 [1.84–3.17]	248 (82.1)	2.69 [1.93–3.74]
No	129 (14.4)	1.00	221 (24.7)	1.00	351 (39.3)	1.00	558 (62.6)	1.00
Job strain								
Yes	109 (37.8)	3.38 [2.50–4.57]	134 (46.5)	2.21 [1.66–2.93]	165 (57.3)	1.75 [1.33–2.30]	241 (84.0)	2.72 [1.92–3.84]
No	158 (15.8)	1.00	255 (25.6)	1.00	403 (40.4)	1.00	621 (62.3)	1.00

\*Adjusted for sex, position, and department

improvements can include measures to prevent stress or to further develop workplace health promotion in the hospital. This could also include changing working practices using innovative working hours schemes, decreasing the documentation and administration load, and delegating selected medical tasks to other personnel.

The effort-reward imbalance model also suggests that, along with salary, the recognition and esteem of superiors and colleagues is particularly important in terms of rewards, and this is especially true of residents. According to the demand-control model, a broadening of the treatment and decision latitude also plays a significant role.

**Methodological limitations**

When classifying the results of the study presented here, methodological aspects must be considered. The stratified sample means that different response rates can be calculated for the survey of hospital doctors. For doctors in the participating hospitals the response rate was 65%. Such a high response rate is certainly satisfactory in light of the population, which is considered comparatively difficult to survey.

It is relevant methodologically that all the variables used in the analyses are based on self-assessments. In light of this it must be asked how relevant the data from the hospital doctors are in terms of psychosocial stress. The measurement using both models of stress theory draws on validated instruments (10, 11, 12) that have been successfully used in other surveys of doctors (14–18). The remaining indicators were developed specifically for the study or were derived from other studies (23), and they have not yet been sufficiently validated. Finally, it must be emphasized that the cross-sectional design of the study means that no causal inferences can be made from the correlation analyses.

**Conclusion**

The current study contributes to the systematic examination of workplace stress in hospital doctors. The study shows that hospital doctors in surgical specialties in Germany are subject to an increased risk of

psychosocial stress. This is particularly true of (younger) residents. Such stress poses a threat to the doctors' own health and the quality of the health care that they provide. Integrating established models to study psychosocial stress enables us to develop interventions based on theory to prevent stress and to improve working conditions in hospitals.

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**Conflict of interest statement**

The authors declare that no conflict of interest exists according to the guidelines of the International Committee of Medical Journal Editors.

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**Corresponding author**

Prof. Dr. phil. Olaf von dem Knesebeck  
 Institut für Medizin-Soziologie, Universitätsklinikum Hamburg-Eppendorf  
 Martinistr. 52  
 20246 Hamburg  
 o.knesebeck@uke.uni-hamburg.de