Original article

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Indoor-air-related complaints and symptoms among hospital workers

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Objectives The aim of this study was to assess the perceived indoor air quality and work-related symptoms among hospital employees in a national survey.

Methods Indoor-air-related symptoms were studied among hospital workers in a questionnaire survey in which employees (N=5598) from 10 central hospitals participated. The survey was based on the Indoor Air Questionnaire (MM-40) by the Finnish Institute of Occupational Health.

Results A total of 3811 employees returned the questionnaire (response rate 68%). The environmental problems most frequently reported were dry air (reported by 46% of the respondents), stuffy air (40%), noise (30%), draft (27%), and unpleasant odor (26%). The most common symptoms were nasal irritation (reported by 25% of the participants), hand irritation (24%), eye irritation (23%), and fatigue (21%).

Conclusions Complaints associated with dry and stuffy air, noise, draft, and unpleasant odors were more common in hospitals than in office environments. Irritation of the nose, hands, and eyes, as well as fatigue, were also experienced more often in hospitals than in office environments.

Key terms complaints; hospital; indoor air quality; questionnaire survey; symptoms.

Indoor air of poor quality at work decreases employees' comfort and work efficiency and may also be the cause of some work-related symptoms and diseases (1, 2). Furthermore, indoor air problems have been associated with a decrease in work productivity (3).

Indoor air quality in hospitals is a significant factor with respect to both the health of employees and the treatment of patients. The quality of indoor air in hospitals is affected by factors such as the use of anesthetics, the chemicals used in laboratories, medical substances, and residuals caused by operations such as dust from plaster, glass fibers, and natural rubber latex, as well as infectious microbes. In addition, microbes and microbial metabolites originating from moisture damage in hospital buildings may contaminate indoor air.

Hospital work has become more diverse and efficient. Patients in a weak condition are treated with more potent medicines, and hospital workers are exposed to hazardous microbes from seriously ill patients. The risk of contagion is not only present through direct contact with a patient, but also through indoor air.

A significant number of the hospital buildings in the 20 Finnish hospital districts were built from the 1950s through to the 1970s. The construction and ventilation techniques of that time do not completely correspond with contemporary requirements. A general overhaul would require significant financial resources, and the realization of major renovations cannot be easily arranged in a hospital environment. The mistakes made in construction planning, building processes, and, eventually, in use, have led to many hospital buildings suffering from significant moisture damage, which also includes mold problems.

According to a national occupational health survey conducted by the Finnish Institute of Occupational Health in 2003 (4), some 20% of hospital and health care personnel reported the smell of mold in their work environment. Between 1999 and 2001, on the average, 40 to 50 new cases of occupational disease caused by microbes from moisture damage in buildings were reported annually among Finnish hospital and health care workers. Alongside education professions, social and health care workers constitute a large group of professions within which occupational diseases related to moisture damage were reported in Finland. Two-thirds of all new cases of occupational disease were reported from these two branches. The number of cases with occupational diseases could be even larger because only

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some of all work-related diseases caused by exposure to moisture damage and mold get reported to the national register, mainly due to the fact that the diagnosis of mold-related diseases is difficult, since there is a lack of diagnostic criteria, validated methods, and test reagents to verify the diagnoses of indoor-air-related diseases.

The extent of moisture and mold problems in Finnish hospital buildings and the number of employees exposed to mold have not been previously studied.

In our present study, we carried out a national survey to assess perceived indoor air quality and work-related symptoms among hospital employees.

Study population and methods

The modified Indoor Air Questionnaire (MM-40) by the Finnish Institute of Occupational Health (5, 6) was sent to the employees of different hospital departments. In order to get as even a geographic distribution as possible, the hospitals were selected from many different locations. We also wanted the buildings to represent as many different construction eras as possible.

The questionnaire was distributed to 5598 workers in 10 hospitals in the spring of 2004. The questionnaires were delivered to inpatient wards, out-patient clinics, laboratories, the staff of the operating rooms, radiology departments, and rehabilitation units. Each hospital received questionnaires proportional to the number of the entire staff of the facility. The indoor air survey was conducted in cooperation with the hospitals' own occupational health care staff, which accomplished the distribution, collection, and the archiving of individual information. A group of experts at the Finnish Institute of Occupational Health processed the information from the questionnaires and stored the data anonymously.

Table 1. Environmental complaints and work-related symptoms of the hospital and office workers.

	Hospital respondents (N=3811) (%)	Office respondents (N=11 154) (%)
Environmental complaints		
Dry air	46	35
Stuffy air	40	34
Noise	30	17
Draft	27	22
Unpleasant smell	26	17
Excessive room temperature	22	17
Fluctuating room temperature	20	16
Static electricity	19	8
Dim light or glare/reflections	19	14
Dust or dirt	13	25
Room temperature too low	13	13
Smell of mold or cellar	12	–
Environmental tobacco smoke	5	4
Work-related symptoms		
Irritated, stuffy or runny nose	25	20
Hands dry, itching, red skin	24	15
Irritation of the eyes	23	17
Fatigue	21	16
Hoarse, dry throat	17	14
Dry or flushed facial skin	12	11
Headache	9	7
Cough	8	5
Muscular and joint pain	8	–
Scaling or itching scalp or ears	6	6
Difficulties in concentrating	3	3
Fever or chills	2	–
Shortness of breath	2	–
Nausea or dizziness	1	1
Wheezing of breath	1	–

Results

As many as 3811 employees participated in the survey. The response rate was 68%. The mean age and gender distributions of the respondents in our survey were similar to the figures in the national register of hospital workers in Finland. Table 1 presents the most common complaints and symptoms associated with indoor air and reported by the hospital workers in our survey in comparison with data from the office workers in the reference material. The most common problems in the work environment were dry air, stuffy air, noise, and draft. In addition, unpleasant odor, excessive room temperature, fluctuating room temperature, presence of static electricity, and poor lighting and glaring were reported. The odor of mold was reported by 12% of the participants in the survey.

The most common symptoms associated with the work environment were irritation of the nose, hands, and eyes and fatigue. In addition, irritation of the throat, facial skin irritation, headaches, and coughs were also present.

The participants in the survey also reported previous allergic diseases. Asthma was a problem for 10% of the participants, 42% had hay fever or other allergic rhinitis, and 28% had atopic eczema. Recurrent respiratory infections during the past 12 months were reported by 26% of the participants.

Discussion

A recently conducted survey in Finland (5) found an increased prevalence of complaints and symptoms

associated with indoor air among office workers (table 1). In the interviews for the "Work and Health in Finland 2003"(4) survey by the Finnish Institute of Occupational Health, 20% of the social and health care workers reported a smell of mold in their workplace.

A comparison of the data collected in office environments with data on the staff of the hospitals participating in the present national hospital survey, the hospital staff experienced environmental problems with dry and stuffy air, noise, draft, and unpleasant odors more often than office workers. In addition, the prevalence of complaints about high or fluctuating temperature, the presence of static electricity, dim light, or glare was also higher in the hospitals. According to the recent national interview (4), the smell of mold was reported more often in health and social services than in office environments. In our survey dust and dirt were reported less frequently in hospitals than in offices.

The hospital staff participating in our study reported work-related weekly symptoms of the nose, hands, and eyes, as well as fatigue, more often than the office workers. They also reported irritation of the throat, headache, and cough slightly more frequently.

There are several likely causes for the complaints. The complaints among the hospital workers about dry and stuffy air may be partly due to poor air conditioning. Insufficient air intake has previously been shown to increase such complaints (7). The complaints about odors suggest emission problems from building materials (7). The complaints about noise may be caused by the noise from air ventilation equipment and from hospital activities in general.

The reported symptoms of the nose, throat, and eyes may be attributed to dry indoor air or indoor air contaminants (eg, evaporating organic compounds and man-made mineral fibers). The irritation of the hands may be due to the frequent use of water and cleaning chemicals, as well as the frequent use of protective gloves.

In conclusion, the indoor-air-related complaints and symptoms were more common in the hospitals included in our study than in the reference material from office environments. Our study emphasizes the importance of good indoor air quality in hospitals where the condition of the hospital buildings and their ventilation plays a significant role in the well-being of both employees and patients.

References

1. Reijula K, Haahtela T. Sisäilmasto-ongelmat: altistumisen arviointi ja potilaan tutkiminen, (Indoor air problems: assessment of exposure and examination of the patients). Suom Lääk L. 1998:53:4215–30.
2. Lahtinen M, Huuhtanen P, Vähämäki K, Kähkönen E, Mussalo-Rauhamaa H, Reijula K. Good practices in managing work-related indoor air problems: a psychosocial perspective. Am J Ind Med. 2004:46:71–85.
3. Niemelä R, Rautio S, Hannula M, Reijula K. Work environment effects labor productivity: an intervention study in a storage building. Am J Ind Med. 2002:42:328–35.
4. Reijula K. Microclimate of room In: Kauppinen T, Hanhela R. Work and health in Finland 2003. Helsinki: Finnish Institute of Occupational Health; 2004. p 94–100
5. Reijula K, Sundman-Digert C. Assessment of indoor air problems at work with a questionnaire. Occup Environ Med. 2004:61:33–8.
6. Lahtinen M, Sundman-Digert C, Reijula K. Psychosocial work environment and indoor air problems: questionnaire as means of problem diagnosis. Occup Environ Med. 2004:61:143–9.
7. Anderson K. Epidemiological approach to indoor air problems. Indoor Air. 1998: Suppl 4:32–9.