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## Harmful risk factors in the work of a nurse

### Abstract

**Introduction.** Nurses are exposed to harmful and troublesome factors, as they come in contact with all sorts of dangers every day.

**Aim.** The aim of this paper was to assess the degree of exposure of hospital nurses to harmful and troublesome factors, and to examine a relationship between selected non-measurable characteristics.

**Material and methods.** The study was conducted among 115 randomly selected respondents employed in hospital wards of the Independent State Health Care Centre in Sieradz in April 2011. The authors of the study used a survey questionnaire. The chi-square independence test was applied to determine the dependence. The strength of this relation, if statistically significant, was examined with the C-Pearson's contingency coefficient.

**Results.** The respondents are aware of adverse effects of biological, physical, chemical and biopsychosocial factors. Less than 50% of the respondents are overstrained due to shift work. One hundred-and-eleven respondents from the studied group assessed their work as burdensome. They blamed physical and mental overstrain, a shortage of medical personnel and great demands for that situation. The statistical analysis showed a relationship between an increased occurrence of factors negatively affecting the osteo-articular system in the workplace and the shift work system, the shift work system of nurses and a general feeling of excessive strain, inconvenience of work and presence of factors overstraining the osteo-articular system. In the first case, the strength of this relationship was moderate, it was strong in the second case and weak in the third one. However, no correlation was observed between the occurrence of mental and physical ailments at nurses and aggression at work.

**Conclusions.** Bearing in mind the harmful character of the studied factors we should deepen knowledge in this sphere and apply prophylaxis. Moreover, employees should be made aware of effects of a proper kind of relaxation after work and the importance of measures to prevent infections.

**Keywords:** harmful and troublesome risks factors, the chi-square independence test, the C-Pearson's contingency coefficient.

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### INTRODUCTION

Nursing care is one of the most crucial elements of a health care system, which is permanently exposed to harmful and burdensome factors. The first ones might lead to a disease or health disturbance and the other ones – to tire-some and temporary deterioration of health.

Nurses belong to a professional group, which is particularly exposed to biological, chemical, physical, ergonomic and psychological factors. In a hospital environment they come into a close contact with biological material, including blood pathogens. Thus, they are exposed to biological factors, as breaking the tissue continuity causes infections, which then leads to occupational diseases common for nursing personnel. Also chemical factors (allergenic and toxic compounds) and physical ones (various kinds of ionizing radiation, electromagnetic field and noise) are life- and health-threatening.

Another important factor is excessive physical exercise and a forced posture since they contribute to diseases, which result from overstraining of the locomotive system. Moreover, shift work, night duties, violence, aggression and mobbing negatively affect the work of female/male nurses. In a consequence, they feel stressed and professionally burnt out. In Poland, an occupational disease is "the one which has been entered into a register comprising diseases which are caused by troublesome or harmful factors present at a workplace" [1]. The harmful factor which affects the work, burdensome work and sensitivity of the individual person, contribute to the degree of severity of work, which in other words, does not correspond to individual capabilities.

All professional groups in Poland, including female/male nurses have a right to work in a safe and hygienic environment. It is guaranteed in the Constitution of the Republic of Poland, in Article 66 of this fundamental act of law [2].

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The main source of duties and rights of an employee and an employer on safety and health at work is the Labour Code [3]. Chapter X contains essential regulations on safety and health, Chapter VII bears information on the protection of female work and Chapter IX – on the protection of junior employees. Apart from those, Health and Safety Regulations also include procedures of right conduct required while performing a particular job (work), introduced due to previous experience, technical or scientific reasons [4].

## AIM

The study was conducted in order to evaluate the degree of exposure to factors hazardous for health and life among female/male nurses employed in hospitals. Moreover, the article presents a subjective assessment of inconvenience of work as a nurse. The authors evaluated a relationship between selected characteristics.

## MATERIAL AND METHODS

The authors used a direct interview method in a form of an anonymous survey, where the questionnaire consisted of 31 questions (5 metric, 9 closed, 13 semi-open, 4 open). The questions referred to threats, which female/male nurses have to face up to while working in hospitals. One hundred and fifteen subjects (113 female nurses and 2 male nurses) employed in basic and specialist hospital wards of the Independent State Health Care Centre in Sieradz in April 2011 were asked to answer the survey questions.

The authors used a random method while selecting the respondents.

Moreover, they analyzed the relationship between non-measurable characteristics. To determine this relationship the authors applied the chi-square independence test and to determine how strong the relationship is they used the C–Person's contingency coefficient [5].

The article verified the following study hypotheses:

1. There is a relationship between an increased occurrence of factors negatively affecting the osteo-articular system in the workplace and the shift work system.
2. There is no relationship between psychophysical disturbances and the aggressive character of work in nurses working in hospitals.
3. There is a relationship between the shift work system of nurses and a general feeling of excessive strain.
4. There is a relationship between the evaluation of this kind of work as burdensome and the presence of factors overstraining the osteo-articular system.

## RESULTS

At the beginning of the survey the authors determined the following demographic features of the studied group: the sex, place of living, number of years of work, system of work, education.

The surveyed respondents are: females (98%), living in cities (70%), mainly young – up to 30 years of age (18% of the respondents were aged 16-20, 34% – 21-25, 17% – 26 -30).

With regard to education the subjects had: secondary education (61 subjects), post-secondary (29 subjects), vocational higher (11 subjects), Master's degree in nursing (6 subjects), other university (8 subjects). The majority of them worked shifts (103 nurses); the remaining people worked in a single-shift system.

Those who work as nurses are exposed to factors, which negatively affect health or are burdensome for work. Most of the respondents are aware of being threatened with biological, physical, chemical and biosocial factors (Figure 1).

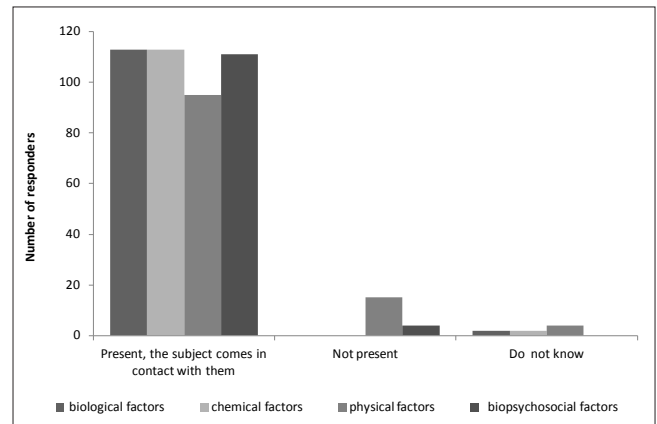


FIGURE 1. Presence of some harmful factors.

Source: Own analysis

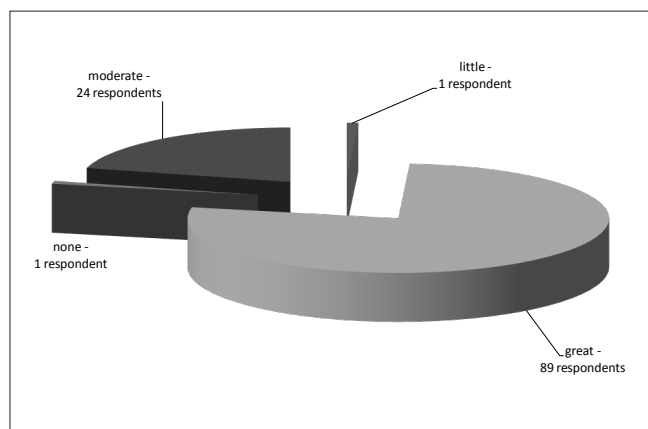
The analysis of the above figure allows us to make a conclusion that the studied respondents are aware of biological (bacteria, viruses, fungi) and chemical (irritating disinfectants, anaesthetic gases, drug fumes, latex gloves) factors at their workplaces. A hundred and thirteen subjects confirmed they come into contact with such factors, only two said they do not know whether they are exposed to such factors or not.

With regard to exposure to physical factors (radiation, electromagnetic field, noise), the situation is different. Also a great majority of the respondents are aware of hazards resulting from the contact with these substances and confirm they are exposed to them (95 respondents). Fifteen people cannot see any hazard and another four subjects do not know what opinion they should hold on this issue.

With regard to exposure to biosocial factors, all the respondents held the same opinion. As many as 97% claimed they were exposed to aggression; only 4 people did not see any threat. The analysis of the questionnaire answers revealed that in most cases nurses have to cope with shouts, indecent vocabulary; they are offended or intimidated. More than half the respondents claim that hostilities mainly come from patients and their families; however, the subjects' superiors and workmates (c. 5%) can also be aggressive.

Other harmful factors which affect the work of nurses include: overstrain of the osteo-articular system (Figure 2), frequent contact with patients' blood and secretion, hurting themselves with used needles or other medical instrument.

Having analyzed harmful factors overstraining the osteo-articular system such as: improper, forced posture, long standing, lifting and moving patients, it can be observed that 77% of the studied subjects claimed that the level of hazard at their workplace was high. In the opinion of twenty four subjects the level is moderate. Only two subjects said that the hazard was little or none.



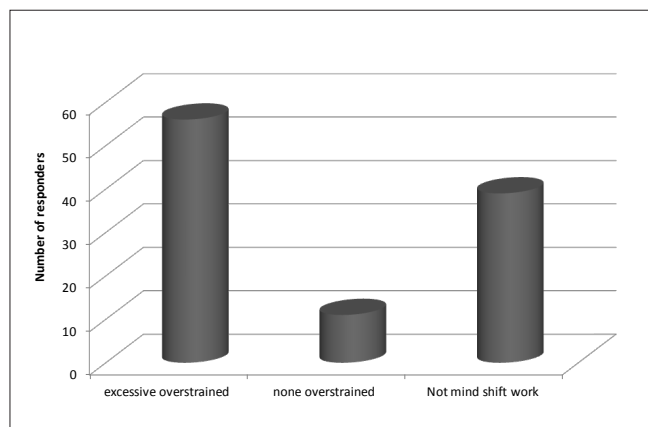
**FIGURE 2. Degree of exposure to factors overstraining the osteo-articular system.**

Source: Own analysis

Sixty-six percent of the studied respondents claimed that they very often come in contact with patients' blood and secretion (more than ten times during one duty); hurting themselves with used needles or other medical instrument happens infrequently (few times in a year) (93 subjects).

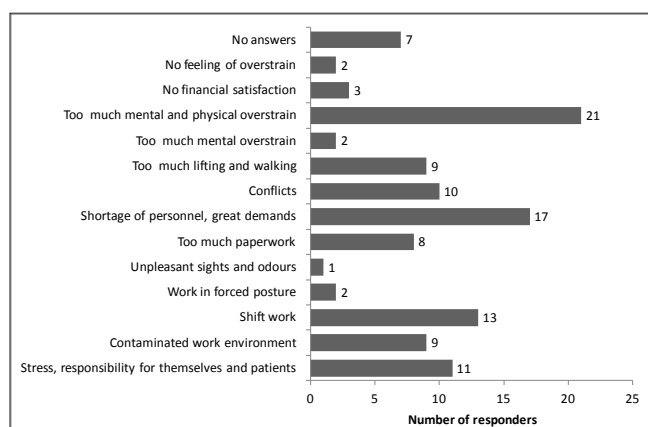
Moreover, of 106 respondents (9 people had single-shift work) more than half of them said they were overstrained with doing shift work; 39 respondents said they did not mind working in that system (Figure 3).

The subjects feel overstrained because of night duties, physical and mental tiredness, sleeping disturbances, irrita-



**FIGURE 3. Feeling of being overstrained with shift work.**

Source: Own analysis



**FIGURE 4. Reasons for burdensome work of a nurse.**

Source: Own analysis

tion, disruption of circadian rhythm, stress. Some respondents claimed that such system is good as it allows them to find extra employment in other workplaces or their way to get to work is convenient.

One hundred-and eleven subjects assessed their work as tiring because of great physical and mental strain, a small number of personnel, great demands set by patients and employers, stress, responsibility and kind of work (Figure 4).

Having analyzed the above figure it can be concluded that 2 subjects do not feel overstrained with work and in 7 cases we are not able to identify burdensome factors since the respondents have not given any answers.

We assumed that there is no relationship between non-measurable values in the null hypothesis (H0) and there is a relationship between them in the alternative hypothesis (H1). The conducted analysis allowed us to receive the following results:

**TABLE 1. The study results.**

Hypothesis number	Value $\chi^2$	Board values $\chi^2$	P value	Interpretation	C-Pearson's contingency coefficient	Strength and relationship
1	26.92	7.82	0.05	Rejecting H0 in favour of H1	0.44	Moderate
2	13.31	19.68	0.05	No justification for rejecting H0 in favour of H1	0.32	Weak
3	85.03	11.07	0.05	Rejecting H0 in favour of H1	0.65	Strong
4	13.53	12.59	0.05	Rejecting H0 in favour of H1	0.32	Weak

Source: Own calculations

## DISCUSSION

Nursing personnel is susceptible for exposure to harmful factors, which can include: biological, chemical, physical and psychosocial ones as well as diseases, which are caused by the physical overstrain of locomotive organs.

Biological factors, which put the life of a nurse at risk include viruses, bacteria, fungi, parasites so micro- and macro-organisms, which produce substances harmful for a human body and in that way, contribute to occupational diseases.

The force of the activity of these organisms depends on the pathogenic activity of a particular factor as well as the immune barrier of the exposed body. The concentration of a biological factor and the period of contact with a human body do not have anything in common with the body's reaction. It frequently happens that an infected body of a nurse produces a sufficient immune barrier [6].

The described factors can spread to a human body in five ways: via air, droplets, water, food and through infected things, e.g. syringes or other medical instruments. It contributes to diseases: contagious (legionellosis), allergic (asthma, allergic alveolitis, allergic rhinitis, rash), immunotoxic (toxicosis, byssinosis).

Those who are particularly exposed to harmful biological factors are nurses employed in infectious diseases wards, surgical, pulmonological, hepatological, gynecological and obstetrics, hemodialysis wards and also in intensive care units [7].

Other harmful factors which are often observed in the workplace of a nurse are chemical substances. They may contribute to pregnancy disturbances, miscarriages or congenital diseases in babies. Personnel of operational theatre and sterilization blocks are particularly put at risk (The hazard is connected with the application of gas anaesthetics, disinfectants and other chemical factors and the release of biological material as a consequence of thermal decomposition). The substances might irritate the skin and respiratory tract and contribute to allergic dermatitis and bronchial asthma [8].

Physical factors are closely connected with the individual person's activity in his workplace. With regard to psychosocial factors, they do not directly affect the human body.

The table presents harmful factors which a nurse is exposed to at his/her workplace.

The analysis of the last factor negatively affecting the work of a nurse allows for making a conclusion that taking

care of patients who have to remain in bed, especially obese patients, contributes to an overstrain of locomotive organs. An improper forced posture and excessive physical effort lead to such changes.

All the mentioned factors put nurses at risk in their workplaces. The increased risk means an increased danger not only for medical personnel but also for patients.

The increased possibility of a disease or accident at work leads to an increased occupational risk, which is identified as "a possibility of occurring unnecessary incidents at work which might contribute to a loss, negative health consequences due to exposure to occupational hazards at the workplace" [9].

The risk could be decreased, by constant self-improvement and implementation of right personnel management methods, and thanks to right management of information and computer applications [10].

Moreover, right organization of work and workplaces, observing safety and health procedures and elimination health and life hazards (the application of modern technologies, devices, safe substances and materials) help to avoid accidents and exposure to harmful factors [7].

Nursing personnel should bear these factors in mind, deepen their knowledge in this issue and remember about prophylaxis (applying individual protection, wearing protective clothing and gloves, washing hands, which is the most basic activity in a nurse's work). Other aspects are also highly important: careful behaviour, professional experience, observing rules while performing medical procedures.

Active forms of relax (cycling, swimming, aerobics, gardening) are most preferable because they improve physical and mental well-being. However, a great number of nurses (as many as 23% of the respondents) prefer passive relax and do not use any kinds of rehabilitation (which might mean that nursing population enjoys good health, has limited access to rehabilitation or performs so called self-treatment). The authors of the study believe that nurses should be more aware of the relationship between the choice of right form of relaxation after work and health consequences as well as the necessity of activities which aim at preventing infections.

## CONCLUSIONS

Nurses are mostly women with twenty-year professional experience, who have secondary or post-secondary education. They work in a shift system, which threatens them with chronic tiredness, stress, irritation and sleep disturbances. Some nurses think that such system has advantages because in their free time they can take some extra work or look after children. It can be concluded they do not care about their own health, which might have negative implications in the future.

Apart from these, nurses are exposed to many harmful factors (biological, chemical, physical and psychosocial ones as well as factors overstraining the osteo-articular system). They might negatively affect their health. Nurses are very often exposed to more than one factor, which puts their health even at a greater risk. This phenomenon is particularly observed when they work shifts.

**TABLE 2. Harmful factors at a nurse's workplace.**

Factor	Risk
Biological	Viruses: Hepatitis A virus (HAV), Hepatitis B virus (HBV), Hepatitis C virus (HCV), Hepatitis G virus (HGV); HIV retrovirus causing AIDS; adenovirus (Mastadenovirus hominis); retroviruses (Reovirus mammalis); orthomyxoviruses (A, B, C influenza virus); picornaviruses (human enteroviruses); pnoviruses (RS virus)
	Bacteria (gram-negative cocci: <i>Staphylococcus aureus</i> , <i>Streptococcus pyogenes</i> ; gram-positive bacteria: <i>Listeria monocytogenes</i> ; gram-negative bacteria: <i>Salmonella</i> ; <i>Mycobacterium tuberculosis</i> ; syphilis and pathogens causing purulent disorders),
	Fungi ( <i>Candida</i> ; <i>Trichophyton rubrum</i> ; <i>Aspargillus</i> ).
Chemical	Allergenic factors – latex Glover (delayed hypersensitivity to vulcanization accelerators – disulphide atherometyloturan and dimercaptobenzothiazole (so called accelerators) and anti-oxidants (antiageing agents) causing skin lesions, e.g. contact eczema, immediate allergic reaction to latex, e.g. contact urticaria and allergic inflammation of the mucosa of the respiratory tract,
	Disinfectants containing extra active compounds as well as fragrances and dyes (glutaraldehyde, chloramine, chlorhexidine, quaternary ammonium compounds)
	Cytostatic drugs, anaesthetic gases, nickel, antibiotics and other drugs,
Physically	Ionizing radiation, (lasers, X-ray radiation, infrared radiation, ultraviolet radiation (UV)
	Electromagnetic field
Psycho-social	Noise
	Tiredness with shift work and night duties
	Violence and aggression in the workplace
	Stress and mobbing
	Professional burnout

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