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WORKING CONDITIONS AND HEALTH STATUS OF TELEPHONE COMMUNICATION OPERATORS: ANALYTICAL REVIEW

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Introduction. A growing social demand for telephone communication operators in the society «24/7», along with the increasing requirements to their psycho-physiological sphere, actualize studies on dynamically changing working conditions and their impact on the health of workers.

The aim of the study – to reveal the specific features of working conditions and their connections with the functional body state and parameters of health status of telephone communication operators.

Materials and method of research. Analysis of literature from electronic databases of scientific sources on biomedical information (National Scientific Medical Library of Ukraine, National Library of Ukraine named after V. I. Vernadsky, PubMed, Scopus, Embase, Web of Science, CIS, e-library, etc.) and Internet portals Google and Yahoo, using a structural-logical approach and a biblio-semantic method, was made.

Results of studies and conclusions. Characteristic features of the work of telephone communication operators are: intense information and neuro-emotional load; high load on the auditory and visual analyzers, voice apparatus; work in shift schedules, including night shifts, under lack of time, using video displays, computer software, headsets, means of communication, often – under conditions that do not meet hygiene standards. The leading harmful factors of working conditions for telephone communication operators are work strain and noise (Class 3.1–3.2). Microclimate (exceeding the threshold limit values (TLV) for air temperature and speed of air movement; low humidity) and aeroionization of the air (insufficient) also do not meet hygienic standards (Class 3.1). Depending on specific conditions, 15–47 % of telephone communication operators experience occupational stress; up to 80 % of operators report sleep problems. The most common are problems with vision, hearing and voice – the most loaded organs during work. Diseases of the musculoskeletal system (mainly the cervical spine), female pelvic organs, upper respiratory tract (mainly cough), diseases of blood circulation are also prevailing; there are data on diseases of hemopoietic organs, neoplasm, mental diseases. Occupational stress in telephone communication operators increases the number of health complaints. After the age of 45, the functional state of the circulatory system is worsening and the effectiveness of nerve regulatory mechanisms decreases. As a risk group for health, telephone communication operators need specific preventive measures to maintain their health and extend their occupational longevity.

Key words: telephone operators, call centers, working conditions, strain, noise, low levels of electromagnetic fields, vision, voice, functional body state, occupational stress, «burnout», sleep, diseases, blood circulation

Introduction

The work of telephone communication operators has evolved from telephone operators of telephone stations (since 1877, when the first telephone station had been opened in New Haven, USA) to telephone operators of today's call centers (appeared with the launch of the first «Automatic Call Distributors» by Rockwell Galaxy company (USA) in the 70s of the twentieth century), which is now one of the most demanded in the society. By its nature, it was always operator work mostly of mental origin. And if the first telephone operators, in addition to mastering the equipment, needed certain communication skills, for call operators of nowadays it is required a significant amount of reference knowledge specific for each call center, advanced skills on business communication, documentation processing, customer databases. The equipment itself has changed, and a relative share of intellectual and voice loads has increased.

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In the «24/7» society, functioning 24 hours a day and 7 days a week, a consumer market dictates a need for round-the-clock work of call centers, the use of non-standard shift schedules, to which 20 % of workers cannot adapt and are forced to leave their occupation [26].

The occupation of operators of telephone service was traditionally considered to be female and today is one of the most prevailed, where computer equipment and new communication technologies are used.

Under rapid development of new technologies and IP-telephony, a characteristic feature of work activity of telephone communication operators is high nervous and emotional stress caused by the information pressure, lack of time for performing work operations, and high personal responsibility for decision-making. As such occupational activity of a human-operator becomes a source of chronic psycho-emotional stress [34, 37], which can be developed as a result of a prolonged maintenance of the work strain, feeling negative emotions, etc. [18, 37]. As a result, a long-term strain of adaptive mechanisms of almost all physiological systems of the body of a working person is developing, first of all of the central nervous, endocrine, cardiovascular, immune and other systems, which sooner or later leads to their exhaustion and poses a threat to the human health [14, 17]. Today, the most important pathogenetic role of stress in the development of many diseases has been already proven [11, 14].

The growing social need for telephone communication operators, along with the increasing requirements to their psycho-physiological sphere, actualize studies on dynamically changing working conditions and their effects on the health of workers.

The aim of the study – to reveal the specific features of working conditions and their connections with the functional body state and parameters of health status of telephone communication operators.

Materials and methods of research

Using the web interface and client-server database management systems, a literature search was conducted, using the funds of electronic databases of scientific sources of biomedical information – portals of the National Scientific Medical Library of Ukraine, Vernadsky National Library of Ukraine, Russian Scientific Electronic Library (e-library), National Medical Library of the USA (Medline, PubMed), ILO information resources on labor protection (CIS), databases of the Elsevier Publishing House (Embase, Scopus), platforms of the Web of Science. Also, there were used search engines of Internet portals Google and Yahoo.

The literature was analyzed using the personal experience in research on occupational health and physiology of work of individuals of mainly operator's and mental work, working under high nervous-emotional strain, in a shift schedule. A method of structural-logical analysis (for selecting literature sources and their grouping) and a biblio-semantic method (for summarizing the analysis of literary and collected data, studying the state of the problem and determining the directions to its solution) were used.

Results of the study

Work conditions. The occupation of a modern digital telephone communication operator can be presented as a model of intense mental work, the characteristic features of which are: intense information and nervous-emotional strain, high load on the auditory and visual analyzers, voice apparatus, working under lack of time, and in some cases, lack of information. Operators are working with video display terminals using a keyboard and computer software, means of communication and headsets.

The work of telephone operators of a reference-information telephone node involves receiving, processing and analysis of a significant amount of visual and audio information under both its uneven distribu-

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tion within a working time and a hard time limit for receiving a call from one subscriber (6.1–7.2 s), and also the need in continuous attention concentration and its quick switching [1]. The density of the information load during the first 3–4 hours of a day shift is 82–96 %. The high workload on the emotional sphere is formed due to high personal responsibility for the results in solving of the work tasks, the need to strict adherence to time standards on servicing one subscriber and shift production norms, experiencing emotional loads in communication with «difficult», unbalanced subscribers. Poor quality of communication (lack of audibility) often complicates mutual understanding, increasing tension and inducing psychological discomfort.

Studies of work conditions at 15 telephone stations revealed a significant number of visual and acoustic signals, that are processed by telephone operators per hour of work – 175–300 or more, as well as significant loads on their voice apparatus – 15–40 % of the work shift duration [9]. However, these indicators can vary significantly depending on a specific site.

Modes of operation in telephone companies are among non-standard – i. e. differ from a 5-day working week for 8 hours in the daytime. The companies are working around the clock, when for one telephone operator no more than 3 night shifts are provided for a month, subject to the 36-hour working week. There are also the enterprises that use a shift schedule without night works.

The shift character of work, primarily with night hours, is being considered as a factor that increases the strain of work [6], because night works cause strain at the time period that is unforeseen by nature, which entails a willed raise of work tension – more than it is required for the same activity in the daytime. That's why night shifts are the most tiring, accidental and traumatic, less productive [19, 28, 43] and the most problematic for health maintenance [25, 26, 31, 43].

The levels of intellectual, sensory, emotional loads, monotony and characteristics of work regime make it possible to qualify the work strain for telephone operators, according to the Hygienic Classification of Work [6], as harmful, 3rd Class, 1st–2nd degrees [7, 9, 15]. They cause functional changes that are not recovered to the beginning of the next shift and increase the risk of health impairment, including the development of occupational diseases (Class 3.1), or provoke persistent functional disorders, leading in most cases to the increase in work-related morbidity and occurrence of individual cases of occupational diseases resulting from the prolonged exposures (Class 3.2).

The severity of work in this occupation is formed mainly by a large number of small stereotypical movements of fingers (ranging from 11 to 19 thousand per shift), as well as physical inactivity (a sedentary type of work, staying up to 20 % of the shift time in a fixed work posture). However, values of these indicators do not go beyond the criteria of occupational standards, which makes it possible to assess the severity of the telephone operator's work as permissible (Class 2nd) [1, 9], when possible changes in the functional body state are recovered at the beginning of the next work shift and do not adversely affect the health of workers and their descendants [6].

The main factors of the work environment, the levels of which do not meet hygienic standards at the telephone operators' workplaces, are:

- *noise* (Class 3rd, 1st–2nd degree of harmfulness: L = 72–76 dBA equivalent with the norm of up to 65 dBA); the main source of noise load is an audio signal, entering through an acoustic headset, which most often causes acoustic injuries (shocks) as well as background noise in the operating room due to talks of other operators, noise from operating air conditioners, etc.);
- *microclimate* (3rd Class, 1st degree of harmfulness: excess of the TLV for air temperature – up to 2.0–6.0 °C, air velocity – up to 4 times, air humidity below the standard – 33–42 % with a norm of 40–60 %, due to continuous air conditioning); and, often;

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– *insufficient aeroionization* of air in industrial premises – 1st degree, Class 3rd: insufficient concentration of aeroions of positive polarity (6 or more times lower than optimal, lower than minimum) and negative polarity (17 or more times lower than optimal, twice or more times lower than minimum); a polarity indicator at the level of the minimum of the necessary level (-0.2 c. u.) when using a liquid crystal monitor, and much worse (+0.56 c. u.) when using a cathode ray tube [9, 12].

The levels of electric and magnetic fields of 50 Hz at workplaces of telephone operators, the sources of which are video displays, power supplies, the circuit, telephone sets, acoustic headsets, do not exceed the TLVs (8–25 V/m and 0.05–0.8 A/m, respectively). At workplaces, the maximum levels of magnetic induction are recorded at the knees of workers (0.5–1.08 μT). According to the factor «electromagnetic fields», the telephone operator's working conditions are qualified as permissible (Class 2nd) [9].

For call-center operators, working conditions are very similar to those of telephone station operators, however, they can differ significantly, for example, in the character of work, noise load, etc., not only between different centers, but also between operators of the same center. For example, in the call center of the emergency response service (where firefighters, police, and military men work), 35 % of operators receive calls from residents of the city and transfer them to the appropriate response services, 47 % of operators only receive calls from their colleagues, 18 % of operators only call for vehicles or appropriate means to respond [41]. Emotional loads are higher for those who communicate with residents of the city. A quarter of operators consider their work environment noisy. The main sources of noise are called poor acoustics (65 %) and use of a telephone (60 %), less often – working air conditioners (28 %) and echo in the room (22 %). Most often, it is noise in the working room (76 %), less often – noise in other premises (17 %).

The influence of working conditions on the functional body state and parameters of health status of telephone communication operators. Levels of work strain and noise, exceeding hygienic standards and deviating from acceptable levels of microclimate, impede the high-quality performance of work tasks, on one hand; on the other hand, they have specific adverse effects on the visual and auditory analyzers, the vocal apparatus, and also contribute to the development of functional changes in the body, in particular, in nervous and cardiovascular systems, which can subsequently transform into diseases. Low air humidity and, hence, its low electrical conductivity, contribute to accumulation of static electricity on the surface of the human body, which can be an additional reason of adverse changes in the functioning of the cardiovascular, nervous, immune systems, hematopoiesis, and also can result in negative emotional reactions. At the same time, working conditions in some telephone communication enterprises can vary significantly, which affects the structure of morbidity of telephone communication operators.

Thus, in the structure of *morbidity with temporary disability in digital* telephone operators of 15 branches of Ukrtelecom (Ukraine), respiratory diseases (48.0 %) take a leading place, those of the musculoskeletal system (13.3 %) and the nervous system much less (10.2 %), circulatory system (7.4%) [8, 9]. The general morbidity rate with temporary disability is (102.2 ± 12.6) cases per 100 employees. One-time examination of telephone female operators revealed elevated blood pressure (> 140/90 mm Hg) in 27 % of them. The normal type of self-regulation of blood circulation was not found in anyone, the cardiac type was detected in 70 % of the examined, vascular type in 30 % [35]. The transition of the functional state of the circulatory system from the «middle class» to

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the class «below average» (according to the classification of V. A. Buzunov [2]) occurs in 48-year-olds, from «below average» to «low» – in 58-year-olds – earlier than the «retirement» age comes. The pulse rate in 48-year-olds exceeds the upper limit of the physiological norm (80 beats/min), in 50-year-olds – exceeds that for 50–60-year-olds (85 beats/min) and then continues to grow. Consequently, the risk of diseases of the circulatory system in telephone operators increases from 48 years, which can result in the decrease in the effectiveness of their mental activity [13, 33].

The general level of morbidity of female telephone operators of 22 telephone exchanges (Russia) corresponded to the «average» and «below average» in the population, but in that, exceeding the «average regional indicators» for mental disorders, diseases of the female genital organs and pregnancy pathology were detected (up to 30–37 %) [12]. Periodic medical examinations showed a decrease in hemoglobin levels in blood in 23.8% of female workers (below 120 units). Physiological studies over a working day revealed a significant decrease in the processes of excitation in the central nervous system. The authors associate such changes in the health and the functional state of the central nervous system primarily with the effects of a complex of factors of «low» levels. In particular, voltage of electric and magnetic fields at workplaces made 3–5 V/m and 0.7–1.3 μT, respectively, noise levels reached 73 dBA, air temperature exceeded the norm standard by 2–6 °C.

Diseases of the female pelvic organs (43.9 %) and eye diseases (42.7 %) are the leading ones in the structure of *chronic morbidity* among female operators of the information system (in the north-west of Russia), diseases of the bloodcirculatory system were twice less (20.4 %) [7]. No occupational morbidity was detected in the examined cohort; however, only 18 % of women were considered practically healthy. In women with more than 10 years of work experience, compared with those who worked for 5–10 years, the levels of diseases of the bloodcirculatory system were 4,3 times higher; benign neoplasms were detected 4 times more often; blood diseases – 3.7 times; respiratory diseases – 3.6 times; musculoskeletal diseases – 1.5 times.

Increased informational, intellectual, emotional and sensory loads cause an increase the centralization of the regulatory mechanisms of the *bloodcirculatory system* by the end of the work shift, which is manifested in an increase in blood pressure, stroke volume and cardiac output with the decrease in peripheral vascular resistance and an increase in the tone of the parasympathetic nervous system (based on a survey of 250 female telephone operators of «Kazakhtelecom» (Kazakhstan)) [15]. With age, the increase in the tone of the parasympathetic nervous system by the end of the shift is becoming more pronounced (in the group of 35–45-year-olds it increases by 23.9 % by the end of the shift, by 32.2 % in the group older than 45 years) [15], which according to the literature data is associated with the increase in the strain of both the cardiovascular and sympatho-adrenal systems [16], with the decrease in the adaptive resources of the blood circulatory system and worsening in the state of the nervous system [5], with a deterioration in the effectiveness of mental activity [13, 33], and reflects, in general, the age-related growth of the «physiological price» of the work performed. The emotional stress formed during production activities is the very factor that makes a significant contribution to the development of hypertension due to the mechanisms that activate the limbic-reticular formation and the hypothalamic zones, responsible for the emotional sphere [15].

More frequent disorders in the bloodcirculatory system are being detected under more intense influence of electromagnetic fields of the cellular communication with high systolic pressure prevailing among men and myocardial conduction disorders among women [42].

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People who use video displays in their work often complain of visual and musculoskeletal discomfort, headaches, neuro-endocrine disorders characteristic for consequences of the psycho-emotional stress, skin diseases, reproductive health disorders (in women), etc. [7]. Thus, among those working with liquid crystal video monitors, the most frequent are complaints of the musculoskeletal disorders (32 % of the respondents), organ of vision (31 %), digestive system (29 %), respiratory system disorders (19 %), etc. [9].

In the third part of people of mental work involved in the activity with video display terminals (176 persons were examined, average age (40 ± 13) years, work experience (15 ± 10) years), the growth of the sympathetic activation was detected within a shift; among them in 45 % of persons the extrasystole episodes were recorded [10]. The relative risk of obesity development (body mass index (BMI) > 26 kg/m^3) and/or hypertension (systoloc blood pressure (SBP) > 120 mm Hg; diastolic blood pressure (DBP) > 90 mm Hg) in the experience groups of 5–9 years and 10 years or more as compared to the group of 0–4 years amounted to: for BMI – 1.47 and 1.65, respectively (which may be a consequence of the sedentary character of work); for SBP – 0.62 and 1.26; for DBP – 0.76 and 6.38. According to the authors, the comparable data in the experience groups of 0–4 years and 10 years or more for some indicators (increased systolic pressure, sinus arrhythmia, impaired repolarization processes) may indicate a failure of adaptation even at the initial stage [10]. Attention is also drawn to the fact of a significant increase in the risk of the development of isolated diastolic hypertension in trained users of VDT (after 10 years of experience) compared with beginners (up to 4 years of experience) – almost 6.5 times, which may reflect the involvement of the urinary system in adapting to work for VDT.

Personal computer operators have eye diseases (decreased visual acuity and true myopia, impaired binocular (volumetric) vision), decrease in workability, diseases of the heart, kidneys, nervous system, gastrointestinal tract, immune and bronchopulmonary systems, psychic disorders, neurosomatic disturbances [3]. Complaints about the state of health increase sharply with the increase in the duration of work at the video monitor.

A survey of 2130 employees of call centers (France) showed that 77 % of the subjects felt visual fatigue, 50 % – auditory fatigue, 47 % – voice problems, 40 % – psychological distress; complaints of the state of the musculoskeletal system disorders were most often associated with the cervical spine (59 %) [22].

The vision problems, caused primarily by the use of computers and video displays, were reported by 55 % of call center operators, of which 74 % complained of eye fatigue, 68 % – heaviness in the eyes, 55 % – «burning» in the eyes, and 44 % each – lacrimation or weakening of vision (based on a survey of 476 operators, Brazil) [40]. The risk of developing vision problems was increased due to such factors as female gender, lack of recognition at work, organizational problems at the call center, and high demands at work.

In conditions of the call center, in which the individual daily noise level varied from 68 to 79 dBA [(74.7 ± 2.5) dBA] (taking into account noise levels in the work with a headset and without a headset), high-frequency hearing loss (average threshold hearing levels > 20 dB HL at 3, 4 and 6 kHz) and loss of hearing in the zone of speech perception (average threshold hearing levels > 20 dB HL at 0.5, 1, 2 and 4 kHz) were noted in 8.3 % and 6,4 % of the examined ears, respectively. High-frequency scores were recorded in 15.4 % of the audiograms examined. Here the operators were relatively of the young age (19–44 years old; (28.1 ± 6.3) years) with the work experience of up to 12 years (2.7 ± 2.9) years) [38].

Voice problems and upper respiratory health. Voice loads and operators' complaints are different in call centers. So, in some conditions,

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where the average phonation time constituted 15 % of the working time, the duration of the working time did not become a critical factor in the occurrence of voice problems [21]. However, in other conditions, telemarketing call center employees show a correlation between the frequency of complaints of voice problems and working conditions [41]. Complaints of the voice problems, found in 45 % of operators, are explained by the necessity to talk in a noisy environment and the necessity for continuous, long conversations [29].

Complaints of a hoarse, deep, or weak voice are associated with an echo in the workroom, changes in voice after starting work in the occupation, and absence from work due to voice problems. At the same time, complaints of cough with sputum expectoration, dry cough, or dry throat are associated primarily with the intensity of the workload, noise at workplace and from other rooms, radio, and also the same three factors listed above that are associated with complaints of audible voice changes [41].

Complaints of cough and other respiratory problems are the most common for call-center employees, and complaints of coughing after a work shift (80 % of operators) are twice as likely as at the beginning of a shift (40 %), despite the fact that the initial level of such complaints was high (according to surveys in Turkey) – almost in every second worker [24], which may reflect the effect of the «accumulation» of the adverse effects from the previous work shifts on the functional state and health of the upper respiratory tract.

Occupational stress in telephone communication operators. 15–36 % of call center operators evaluate their work as stressful [41], 27–34 % of operators experience severe stress at work [34]. The most common complaints among them are: musculoskeletal discomfort, eye strain, wheezing, or sore throat [34]. Workers with higher levels of stress have more health problems, including eye strain, tinnitus, wheezing or sore throat, chronic cough with sputum, chest tightness, gastritis or peptic ulcer, and musculoskeletal discomfort (with risk coefficients ranging from 2.13 to 8.24) [34]. The more complaints of working conditions, the more complaints of health problems, and more people evaluate their work as stressful [41].

Under high occupational stress, significantly higher values of pulse and systolic pressure within a 24-hour day ($p < 0.007$) and higher values of diastolic pressure during working hours ($p < 0.028$) have been revealed [42].

A significant positive relationship was found between *psychological distress* and the frequency of complaints of the state of the musculoskeletal system [22]. In this case, the risk of psychological distress is increased by such factors as forced full-time job, inability to simultaneously meet the requirements of quality and quantity of work, strained situations with customers, negative comments and lack of recognition from the authorities.

The main factors associated with the *deterioration of the psychic health* in 46 % of call-center operators complaining of occupational stress were identified: low subjective assessment of health status, job dissatisfaction, high demands at work, emotional disagreements among employees [37]. Call center employees experiencing severe emotional stress showed a high level of depression, which was significantly aggravated by fatigue [32].

The same significant prevalence of stress among call-center operators – 46.7 % – was accompanied by a slightly higher prevalence of *anxiety* and *depression* – 57.1 % and 62.9 %, respectively [30]. Poor sleep quality, long commuting time, and lack of leisure facilities in the office were predictors of stress and depression. Physical ailments, absence of hobbies, temporary or part-time job, and long commuting time were all significant predictors of anxiety.

Call-center operators for customer support experience stronger verbal aggression and emotional dissonance than information service operators

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because customers can be aggressive, however, when communicating with customers, call center operators are required to show certain emotions that the company considers acceptable, even if these emotions may differ from their own, which causes a known emotional dissonance [36].

The syndrome of mental exhaustion («burn-out») was registered more often among female operators of telecommunication companies than among their male colleagues [4]. Women are more prone to emotional exhaustion and reduction of personal achievements.

The development of *mental exhaustion* in the each of its three phases – strain, resistance and exhaustion – positively correlates with the duration of daily sleep in female telephone operators engaged in the day and night shifts, while for female telephone operators working only in the daytime, this correlation is being detected only at its first stage (strain) [20], which reflects a greater dependence of mental well-being on the duration of sleep in individuals working day and night shifts as compared with those working only in the daytime.

Night shifts in telephone operators potentiate the development of severe and pathological *chronic fatigue*, as well as development of chronic fatigue closely related on the decrease in systolic blood pressure and impaired blood supply to the brain (decrease in duration of static balancing), which is not observed in operators working only in the daytime, and is a risk factor for the pathology development [23].

Up to 80 % of call-center operators complained of *sleep problems*, including cases at young age (on average, 25 years old) [39]. The risk factors for developing problems with sleep were detected: smoking, loneliness, high workload, lack of opportunity to relax in the office and a long commuting time to the office.

Sleep problems are the first and most common complaints in shift workers engaged in night shifts [25, 26, 31]. However, the shift character of work of telephone communication operators is seldom studied as a factor resulting in adverse changes in the state of health, although its effects are also associated with the pathology development in the circulatory system, gastrointestinal tract, obesity, oncology (breast, female genital organs).

Thus, adverse changes in the state of telephone communication operator's health are largely due to the influence of harmful working conditions, in particular, high neuro-emotional strain (with significant loads on the visual and auditory analyzers, on the voice apparatus), night shifts against the background of harmful noise levels, microclimate, insufficient aeroionization of air, its low humidity and electrical conductivity, causing unfavorable changes in the functioning of a number of physiological systems, organs, and in the body in general.

Despite the wide spreading of the occupation «telephone communication operator» and employment in it of women of active reproductive age, who to a certain extent determine the future reproductive and work potential of the country, this occupational group is not yet well studied. As a health risk group, it requires close attention from researchers, representatives of practical health care system as well as government bodies to the in-depth physiological and hygienic medical monitoring, development of specific preventive measures and managerial decisions to reducing health risks for those working in this occupation.

Conclusions

1. The leading harmful factors of work conditions for telephone operators are work intensity (generated mainly by significant sensory, informational, neuro-emotional and voice loads, shift work with night shifts) and noise (generated primarily by the use of communication headsets, telephones, air conditioners, poor acoustics, noisy surroundings, etc.) (Class 3.1-3.2). The

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microclimate (exceeding the TLVs for temperature and air velocity, low humidity) and aeroionization of the air (insufficient) also do not meet hygiene standards (Class 3.1). However, levels of factors of work conditions may vary in different telephone facilities.

2. The most common health problems in this occupational group, directly related to the equipment used and the character of workloads, are vision problems (as a result of work with video displays), hearing (due to the use of communication headsets and being in the noisy environment), problems with voice (due to conversations in the noisy environment and continuous long-term talks), complaints of sleep (due to the shift schedule of work). In addition, the morbidity of telephone operators also covers the musculoskeletal system (mainly the cervical spine, which may be the result of the forced working posture), the female pelvic organs (as a result of the sedentary character of work), and the upper respiratory tract (due to significant voice loads, mainly coughing), blood circulation (as a result of emotional loads); hematopoiesis, neoplasm, mental diseases (associated with the effects of low levels of electric and magnetic fields). The structure of complaints and morbidity varies in different workplaces due to specificity of workloads and conditions of the work environment.
3. Depending on specific conditions, 15–47 % of telephone operators experience occupational stress, up to 80 % of them – sleep problems. Occupational stress in telephone operators can result in the number of complaints of the health, in particular: of the state of the musculoskeletal system, discomfort in the visual and auditory analyzers, of the upper respiratory tract, diseases of the gastrointestinal tract, occurrence of mental disorders (depression, anxiety, mental exhaustion («burnout»)), sleep problems. After the age of 45, the functional state of the circulatory system is worsening and the effectiveness of the nervous regulatory mechanisms decreases.
4. As a risk health group, telephone operators require physiological, hygienic, medical monitoring, and specific preventive measures for promoting their health and extending occupational longevity.

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