CURRENT ISSUES OF THE OCCUPATIONAL SENSORINEURAL HEARING LOSS EVALUATION IN AIRLINE PILOTS

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Occupational hearing loss in the civilian flight crew members prevails in the structure of occupational hearing loss. The study was aimed to assess errors made in forensic evaluation of flight personnel with hearing loss. A total of 213 definitive diagnoses of occupational hearing loss established in 2015–2021 were assessed. Expert errors were found in 73% of cases. The most common, typical errors were reported that were evident in 12 cases submitted for forensic evaluation. The main errors were as follows: incorrect assessment of the parameters of noise inside the aircraft cabin, lack of knowledge about the clinical and audiological features of noise-induced hearing loss, incorrect assessment of audiological indicators, underestimation of the role of comorbidities, etc. The findings showed that high proportion of occupational hearing loss in the civilian flight crew members was in large part due to imperfection of expert solutions resulting from the lack of knowledge about the basic criteria of the diagnosis and the relationship between the noise-induced hearing loss and profession. The major requirements for evaluation of the relationship between the noise-induced hearing loss and profession and the issues related to professional suitability set out in the current regulatory documents issued by the Ministry of Health of the Russian Federation and seminal publications were not taken into account. The cornerstones of expert work on the issues of the relationship between the hearing organ disorder and profession in the civilian flight crew members were underestimated. This resulted in unsubstantiated professional unsuitability, disability among working-age people, and economic losses.

Keywords: airline pilots, occupational sensorineural hearing loss, expertise, professional suitability

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АКТУАЛЬНЫЕ ПРОБЛЕМЫ ЭКСПЕРТИЗЫ ПРОФЕССИОНАЛЬНОЙ НЕЙРОСЕНСОРНОЙ ТУГОУХОСТИ У ПИЛОТОВ ГРАЖДАНСКОЙ АВИАЦИИ

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Показатели профессиональной тугоухости представителей летных профессий гражданской авиации (ГА) превалируют в структуре профессиональных потерь слуха. Целью исследования было проанализировать ошибки в экспертно-диагностической работе с летным персоналом, имеющим потери слуха. Проведен анализ 213 заключительных диагнозов профессиональной тугоухости за период 2015–2021 гг. Экспертные ошибки выявлены в 73% случаев. Описаны наиболее часто встречающиеся типичные ошибки, которые были явно выражены в 12-ти случаях, представленных на судебно-медицинскую экспертизу. Основными ошибками были некорректная оценка параметров внутрикабинного шума, незнание особенностей клинико-аудиологической картины «шумовой» тугоухости, неправильная оценка аудиологических показателей, недоучет роли коморбидной патологии и др. По результатам исследования установлено, что высокий удельный вес показателей заболеваемости профессиональной тугоухостью у лиц летного состава ГА в значительной степени обусловлен несовершенством экспертных решений, связанным с незнанием базовых критериев диагностики и связи потерь слуха, вызванных шумом, с профессией. Не были учтены основные требования проведения экспертизы связи потерь слуха, вызванных шумом, с профессией и вопросы профессиональной пригодности, изложенные в действующих нормативно-регламентирующих документах Минздрава РФ и основополагающих публикациях. Имел место недоучет опорных моментов экспертной работы по вопросам связи заболевания органа слуха с профессией у представителей летного состава ГА, который приводил к необоснованной потере профессиональной пригодности, инвалидизации работников в трудоспособном возрасте, экономическим потерям.

Ключевые слова: пилоты гражданской авиации, профессиональная нейросенсорная тугоухость, экспертиза, профессиональная пригодность

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Currently, there has been a steady increase in the reported rate of occupational sensorineural hearing loss, that holds first position the structure of occupational morbidity and constitutes over half of all occupational diseases caused by physical factors of working environment, in the Russian Federation (Fig.).

For its part, among all cases of occupational hearing loss almost one third is registered in the civilian flight crew members [2–4].

This is a worrying trend for medical professionals and employers, since civil aviation is one of the leading economic sectors of the country. The hearing ability of the flight crew members is of great professional importance for medical flight safety support [5]. It is worth noting that there is almost no such problem in the world, despite using the same types of aircraft [6–7].

For more than 20 years, 80% of the civil aircraft fleet in the Russian Federation have been represented by foreign-made airliners, the noise levels in the cabins of which do not exceed the sanitary and hygienic standards established in Russia. This means that there is no direct a priori risk of the noise-induced damage to the pilot's hearing organ [8]. However, according to foreign authors, even the noise levels of 90–100 dBA cause no increase in the hearing thresholds of military pilots [9].

The study was aimed to assess errors made in forensic evaluation of flight personnel with hearing loss.

METHODS

The group of experts that included Chief Occupational Health Physician of the Ministry of Health of the Russian Federation (MHRF), Chief Otorhinolaryngologist of the MHRF, two board-certified otorhinolaryngologists-audiologists having a specialization in occupational health and safety, Head of the NGO of the Occupational Health and Safety of ENT Organs, and board-certified occupational health physician provided forensic analysis of 213 definitive diagnoses of occupational hearing loss established in 2015–2021. Expert errors were found in 73% of cases. A total of 12 cases to be submitted for forensic evaluation were selected based on reviewing the evidence used to establish the diagnosis amd criteria for the relationship between the hearing organ disorder and profession (assessment of sanitary and hygienic characteristics of working conditions, clinical and hearing history data, clinical manifestations, features of audiogram graphs provided by the audiogram archive, etc.). The article reports the most common, typical errors that were evident in all of 12 evaluated cases.

Level of evidence C (level 5 evidence).

RESULTS

The earlier publications [10] provide the review of all expert errors observed when performing evaluation of the relationship between hearing loss and working conditions in employees engaged in various “noisy” professions based on analysis of 213 definitive diagnoses of occupational sensorineural hearing loss. This article provides the main errors made in forensic evaluation of civilian flight crew members with impaired auditory perception. A total of 12 forensic evaluations were assessed that had been submitted for peer review in order to determine the validity of the definitive diagnosis of occupational hearing loss.

A thorough analysis of all submitted documentation justifying the relationship of the hearing organ disorder allowed us to identify a number of the most common fundamental errors that had contributed to inaccuracy and insufficient evidence base of the definitive diagnosis in all of 12 cases considered in forensic evaluation.

The most common errors are as follows:

– the main clinical and pathogenetic characteristics that are pathognomonic for noise-induced hearing loss are not taken into account;

– poor quality audiograms or the use of audiograms that show discrepancies between hearing tests performed in different health institutions;

– establishing the definitive diagnosis without taking into account the main criteria for the relationship between the hearing organ disorder and profession set out in contemporary regulatory and methodological documents issued by MHRF;

– incorrect assessment of the parameters of sound pressure inside the aircraft cabin, underestimation of noise attenuation properties of aviation headsets;

– cardiovascular comorbidity, neurological and systemic diseases, lipid disorders not taken into account;

– misrepresentation (or concealment) of the diagnosis in the medical record of employee when performing checkup: establishing various diagnoses, such as eustachitis, tubootitis,

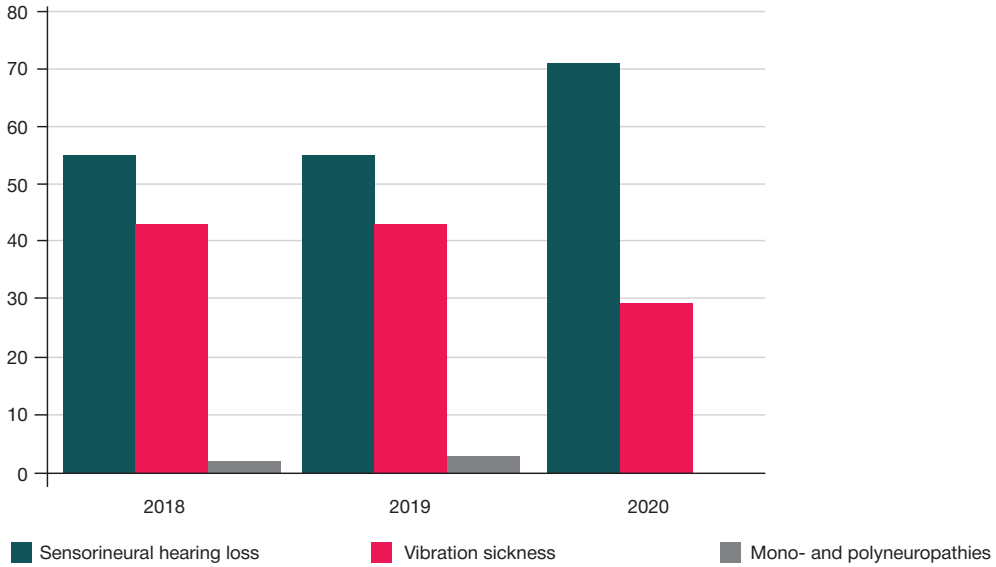

Fig. The occupational sensorineural hearing loss share (%%) in the structure of occupational disorders resulting from exposure to physical factors in the Russian Federation, 2018–2020 [1]

etc., when there are audiograms that show characteristic features of impaired auditory perception;

– inappropriate patient referral for evaluation of the relationship between the hearing organ disorder and profession;

– incorrect estimation of the hearing loss degree as a criterion of professional suitability/unsuitability when suspending the employee from work;

– deontological mistakes consisting in unreasonable patient's fixation on the rental aim due to occupational nature of hearing loss.

DISCUSSION

The main clinical and pathogenetic characteristics of the development and course of hearing loss in airline pilots are discussed in contemporary guidelines [10–12] and articles published by authors that are focused on the issues related to evaluation of the relationship between the hearing organ disorder and profession in employees in leading economic sectors [13–15]. The main issues are as follows: the length of service under exposure to industrial noise exceeding the permissible levels at least 8–10 years, obligatory bilateral onset of hearing loss, gradual worsening of hearing loss, no dissociation between bone-conducted and air-conducted sound perception, dynamic changes in the development of hearing loss and the lack of worsening in patients with industial noise-induced hearing loss during the post-exposure period of working in noisy environment.

However, even the co-authors of methodological guidelines for healthcare practitioners, that contain algorithms for the diagnosis and evaluation of the relationship between the hearing organ disorder and profession, make mistakes, while being members of medical advisory committees. In all the discussed cases, diagnostic errors were due to the use of poor quality audiograms or discrepancies between the hearing tests performed in different health institutions. In such cases, it is necessary to take into account the results of the comprehensive in-depth audiological evaluation performed in the specialized clinic. It should also be borne in mind that discrepancies between the results of the hearing threshold estimation could be due to fluctuations (instability) in the course of auditory perception impairment, which are not typical for noise-induced damage to the hearing organ.

When addressing issues related to possible occupational cause (noise exposure) of auditory perception impairment, the type of audiogram graph is important. Horizontal curve with no features typical for noise-induced hearing loss (dip at 4,000 Hz or less often at 3,000 Hz, significant differences between the mean indicators of speech perception and high-frequency hearing, as well as slow gradual hearing loss) cannot be considered as associated with the noise exposure of the hearing organ. Diagnostic errors result from underestimation of the important role of cardiovascular comorbidity, neurological and systemic diseases, lipid disorders, i.e. the conditions that can cause impaired auditory perception or enhance damaging effects of noise. Discrepancies between the acumetry data and the data of audiometric testing of hearing thresholds are uncharacteristic for noise-induced hearing loss.

Correct assessment of the parameters of sound pressure inside the aircraft cabin is one of the fundamental provisions for evaluation of the relationship between the hearing organ disorder and profession in airline pilots. Such work should be based on the guidelines of Rospotrebnadzor updated in 2022 [16]. According to the guidelines, analysis of the “Sound pressure levels record” for the entire period of flight activities of certain employee with the outlined aircraft type and noise attenuation properties of the used aviation headsets is necessary for evaluation. Only these data can be used when specifying noise characteristics along with the sanitary and hygienic characteristics of the employee's workplace. Unfortunately, the data are being presented based on the parameters of industrial noise for several months of the year showing sample months when the highest levels that exceeded permissible exposure limits (PEL) are observed. It is also necessary to take into account the flight experience requirements currently used in civil aviation: in 1990s, flight load significantly decreased, that is why pilots were protected against noise inside the cabin by the reduced time of exposure [17].

When undergoing medical examination (Medical Flight Expert Commission) according to regulations of industry requirements [18], pilots often conceal their complaints due to fear of losing their job, and present with complaints of hearing loss (often even exaggerating) only when they are declared unsuitable for flight duties. In such cases, physicians, who perform medical examination of employees, give in to the employees' intense desire to pursue their professional activity and therefore report “masking” diagnoses (eustachitis, tubootitis, etc.) in medical records regardless of the fact that there are audiograms that show characteristic features of impaired auditory perception.

Detailed documentation of the hearing loss degree as a criterion of professional suitability/unsuitability when suspending the employee from work based on the correct assessment of the hearing loss degree is the basis of the professional suitability evaluation in patients with noise-induced hearing loss.

We should also note deontological aspects of incorrect expert solutions that result in the patient's rental behavior due to occupational disorder. Unsubstantiated, rash and intolerant comments not supported by objective evidence or documentary proof, claims or promises regarding the fact that employee's hearing loss is of occupational origin result in the patient's unwarranted confidence in occupational nature of the disorder, as well as in rental aim to receive legal redress. This gives rise to medical and social conflicts, as well as to litigiousness, which, in turn, worsen the patient's health condition.

It must be remembered that current regulations for establishing the diagnosis of occupational disease dictate working in two phases that involve making a preliminary diagnosis and a definitive diagnosis [19]. Furthermore, the latter can be made only by the medical commission of the specialized occupational health institution having a license to provide “Occupational Health Service”, “Evaluation of the Relationship Between the Disease and Profession”, and “Evaluation of Professional Suitability” [20].

Resolving the issue of establishing a relationship between the hearing organ disorder and profession is a complex process that requires the engagement of a team of experts: public health physician or occupational health specialist, clinicians (otorhinolaryngologist, general practitioner, neurologist, ophthalmologist), and, if necessary, other specialists being the members of medical advisory committee who have appropriate occupational health and safety certificates of the specialized occupational health institution having a license to provide “Evaluation of the Relationship Between the Disease and Profession” and “Evaluation of Professional Suitability”.

Underestimation of the cornerstones of expert work results in unsubstantiated professional unsuitability, disability among working-age people, economic losses, protracted conflicts initiated by patients or employers that adversely affect the quality of life of the patient, physician and society in general.

Medical ethics and deontology, the main formal logic principles of conducting evaluation suggest that each subsequent evaluation

of the challenging conflict case, especially the one related to the socially significant problem of occupational disorders, should be conducted by more qualified experts. This is necessary to exclude one of the main sources of expert errors, in particular insufficient basic knowledge of methods and inability to apply the theoretical positions of methods in practice [21].

CONCLUSIONS

The high proportion of occupational hearing loss in the civilian flight crew members is in large part due to imperfection of expert solutions resulting from the lack of knowledge about the basic criteria of the diagnosis and the relationship between the noise-induced hearing loss and profession. The main errors are as follows: incorrect assessment of the parameters of noise inside the aircraft cabin, lack of knowledge about the clinical and audiological features of impaired auditory perception, incorrect assessment of the hearing loss audiological indicators, underestimation of the role of comorbidities, etc. The main requirements for evaluation of the relationship between the noise-induced hearing loss and profession and the issues related to professional suitability set out in the current regulatory documents issued by MHRF and seminal publications are not taken into account. Underestimation of the cornerstones of expert work on the issues of the relationship between the hearing organ disorder and profession in the civilian flight crew members results in unsubstantiated professional unsuitability, disability among working-age people, and economic losses.

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