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THE SANITARY AND HYGIENIC CHARACTERISTIC OF WORKING CONDITIONS AND ASSESSMENT OF INCIDENCE OF CONVICTS ACCORDING TO PROFOUND MEDICAL EXAMINATION

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Abstract

The analysis of sanitary and hygienic working conditions and the state of health of the convicts serving sentence in correctional facilities in the territory of the Republic of Tatarstan is submitted. Working conditions of the convicts occupied on productions of corrective labor colonies, in particular, on sewing, foundry and woodworking productions are described. The detailed characteristic of the harmful physical and chemical factors which are adversely influencing health working, features of engineering procedures of the different types of production important from the point of view of a labor hygiene are given.

Results of profound medical examination of the prisoners working in the conditions of harmful productions with distribution on age and length of service are analysed, indicators of weight of labor process are considered.

High frequency of cases of arterial hypertension at workers of foundry, sewing production and the mechanical shop with obvious increase of number of the revealed cases is noted with age.

The analysis of detectability of chronic diseases of respiratory system is carried out (rinopharyngitis, bronchitis, pharyngitis, tonsillitis, etc.). At the same time reliable distinctions between the frequency of detectability and length of service on production are not traced. Connection of number of cases of chronic bronchitis with increase in age is proved. The carried-out sanitary and hygienic assessment of working conditions of convicts was a basis for development of sanitary and hygienic actions for optimization of working conditions and prevention of diseases at convicts.

Keywords: Working conditions, convicts, diseases, profound medical examination.

Introduction: The set of publications in which sanitary and living conditions in institutions of the Management of Corrective System (MCS) are estimated as extremely adverse [1-6] is devoted to position of the Russian prisoners. However only regarding works the detailed analysis of working conditions and the state of health of convicts contains.

Medical support in penal correction systems institutions represents the state system of providing convicts with all types of the medical and preventive help based on the principle of availability [7-11]. One of its main objectives is sanitary inspection behind working conditions of the contingent of correctional facilities and performing medical examinations for the purpose of timely identification of persons with before - and pathological states.

Work purpose. To study influence of sanitary and hygienic, harmful working conditions in the colonies located in the territory of RT on developing of noninfectious diseases by results of profound medical examinations of the prisoners occupied on various productions.

Materials and Methods

Methods of studying of hygienic working conditions of workers, harmful factors of production in colonies of RT were used.

Object of research were the convicts occupied on manufacturing installations in corrective colonies of ordinary regime, colonies settlements.

For assessment of influence of sanitary and hygienic working conditions on incidence of convicts the technique "The relation of chances" was used [12]. Sanitary and hygienic assessment of working conditions on various productions was estimated on a complex of adverse factors of a working environment and labor process: noise level, light environment, vibration; content in air of a working zone, harmful chemicals, existence of physical overworks and touch loading, monotony of work, working pose. In workplaces tool measurements of physical and chemical production factors were carried out, indicators of weight and tension of labor process according to the existing normative documents are defined, injury prevention of jobs and security with individual protection equipment is estimated. The package of the STATISTICA for Windows application program (StatSoft, version 6.0) was applied to statistical processing of results of hygienic researches and these chemical analyses.

Results. Only 708 prisoners had profound medical examination.

On sewing production 250 workers are examined. Work on the preparatory site (unpacking, development, a measurement of fabrics) and in sewing shops (production of a flooring, chaking of curves, cutting of a flooring, completing of details of a cut and connection of separate parts of a cut in a product, its final processing) is connected with long stay standing and considerable physical activity, monotonous work in halfbent position of a body with a trunk inclination forward and sideways, with the monotonous often repeating movements of brushes and forearms.

It is necessary to refer wide use of the synthetic, artificial and nonwoven fabrics processed by special impregnations which at unloading of rolls in the next 10-15 days are capable to emit various chemicals to features of modern fabrics (a nitrile of acrylic acid, formaldehyde, etc.). When heating fabrics in time irons of products pollution of the air environment (in the form of small concentration of formaldehyde, ammonia, oxide and carbon dioxide) increases by 1,5-2,5 times in comparison with jobs of seamstresses-mechanics. When tailoring products from glue heat-insulating import fabric releases of vinyl-acetic ester, dibutylphthalate and ammonia are found.

It is necessary to carry to number of harmful factors also dust vegetable (cotton fiber) and an animal (woolen fabrics) of an origin. Dust-fusing when cutting and tailoring products from fur fabric are especially considerable that is followed by formation of small particles of chemical fiber.

As sources of noise and vibration serve, first of all, sewing machines. The most intensive noise generated by operation of sewing machines is noted at high frequencies. Noise of special cars (loopy, button, overlock) has a maximum of sound energy at low frequencies. Sewing machines are created by average and high-frequency noise, the exceeding maximum-permissible level (MPL) on 1-12 dB that constitutes considerable danger to workers in respect of a hearing disorder.

The contact with chemical materials (the imitation leather and fabrics processed by impregnations) can lead to development of a professional dermatosis. Performance of the operations demanding the big tension of sight stimulates development of short-sightedness.

In foundry production 253 workers are examined. The most adverse in the hygienic relation are operations of loading of metal and furnace charge, melting and pouring of metal. The final stages of foundry production include:

- knockout from a molding, i.e. extraction of castings still hot metal (cast iron at a temperature of 500-8000C, aluminum – 200-3000C, magnesium – 100-1500C) from the frameworks containing the forming earth;
- knockout from castings of the burned-out cores;
- the subsequent to a stump and cleaning of castings.

The major harmful and dangerous production factors of foundry production are: dust of disintegration and condensation; vapors and gases changing a microclimate; the increased noise level and vibrations; electromagnetic radiation; physical overworks of separate bodies and systems; the increased danger of traumatism because of high voltage in electric chains, moving cars and mechanisms, mobile parts of the equipment and transport.

Considerable part of dust is made by the silicon dioxide which is emitted at preparation of forming and rod mixes, knockout and cleaning of castings. Such dust belongs to disintegration aerosols. When melting metal the aerosol of condensation which basis is ultrascope parts of metal is formed.

The excess allocations of heat forming a microclimate of air of a working zone with allocation of radiation and convection heat from the equipment and heated surfaces take place when melting metal, filling, drying of forms, heat treatment. Noise impact on workers of the thermal site is created by conveyor and pusher furnaces, hoisting-and-transport mechanisms. The increased levels of local vibration take place at a stump.

On woodworking production 58 people are examined. For production of frames, doors, plywood, plates and a parquet applies sawing frames, planing, etc. machines, the press, drying cameras. The equipment for processing of wood is a noise source. Noise from debarking drums, power-saw benches and circular saws in the field of average and high frequencies can exceed maximum permissible values

The wood dust having dust particles of the extended form with sharp breaks and branches with keen edges, is capable to injure covers of the top airways and eyes. Dust contains extraction substances which can be toxic also allergens for the person. Weight of labor process is formed of a complex of many factors. Considerable static and dynamic load of muscles of shoulders and humeral belt. The production microclimate on the site of a woodworking more depends on climate of external air as similar rooms have big doorways. On the painting site 42 persons are examined. When performing of the specified types of works the low level of mechanization, generally hand nonmechanized labor is noted. When performing plaster works excess of admissible indicators on a number of the signs characterizing weight of labor process, namely, lifting and moving freights manually, stay in the fixed working pose with the raised hands to 50% of change, existence of the compelled case inclinations to 300 times (tab. 1) is noted.

Table 1: Indicators of weight of labor process when performing plaster works in penal correction systems institutions in RT for 2014.

Name indicator, unit of measure	Class conditions work	Indicator size		
		admissible	fact	difference
Physical dynamic activity with participation of muscles of hands or cases, kgm	2	15 000	12 382	-2 618
The weight of the lifted and moved freight at alternation with other work, kg	3, 2	10	12	+2
Lifting and moving weight during change, km	2	7	3,5	-3,5
Static loading one hand, kgf x s	2	20 000	19 020	-980

Static loading for change at deduction of freight, efforts by two hands, kgf x s	2	42 000	36 796	-15 204
Stereotypic labor movements (quantity) with regional loading with primary participation of muscles of hands and a humeral belt, kgf x s	2	20 000	20 000	0
The working pose fixed with the raised both hands higher than 90°	3, 1	-	Under 50% of shift	Under 50% of shift
The case inclinations (compelled more than 300), time	3, 2	-	> 300	> 300
The movements in space caused by engineering procedure, km	1	-	under 4	under 4

Except the harmful factors characterizing weight of labor process painters are influenced by chemical factors – couples, aerosols of organic solvents, limy solutions and paints. Pentaphtol enamel, synthetic drying oil, paints, solvents is most often used (turpentine, uat-alcohol, solvit).

Paintings are carried out at the variable temperatures open window and doorways therefore the microclimate of rooms where jobs are located, is as close as possible to climate of the area and depends on a season of year.

Mechanical shops are intended for metal machining (turning, planing, drilling, milling, grinding, expansion, etc.). In mechanical shops 105 people are examined.

The integral component of work on metal-cutting machines is use of lubricant cooling liquids, including liquids on an oil and water basis with various additives (sulfur, phosphorus and their connections), polymeric compositions, surfactants, etc. They are applied to cooling of the cutting tool and acceleration of technology of processing of material.

At intensive formation of heat the cutting tools cool with special emulsions. Acid, solutions of alkali and water are a part of emulsions lubricating and machine oil, naphthenic. Neutralize emulsions solution of the calcinated soda. In the course of work water evaporates and in an emulsion concentration of oil and soap, inorganic impurity, alkali increases. In the course of their use control of composition of lubricant cooling liquids and their timely replacement is necessary.

Processing of details on metal-cutting machines is carried out under sight control, it is necessary to distinguish divisions of scales of measuring devices and tools. The sizes of various details make 0,2-0,3 mm at the small contrast of a background and detail. On machines with numerical program control and automatic and revolving it is necessary to watch purity of processing of a surface of details. In this regard the sufficient level of illumination in workplaces is required: in mechanical shops surely combined (the general and local) lighting.

The analysis of incidence among convicts showed that among diseases with temporary disability (ZVUT) on all productions the most frequent are acute respiratory diseases and flu, and also diseases of cardiovascular, musculoskeletal and nervous systems.

The work connected with constant application of variables in size of efforts and made in the compelled pose interferes with blood circulation in the lower extremities of the working convicts and promotes emergence of developments of stagnation in them. Results of profound medical examination working at the enterprises of OFPS of Russia for RT revealed that incidence of workers of all productions of thrombophlebitises and varicosity of veins of the lower extremities is very high. At 78,8% of workers at the age of 35-49 years, at an experience by this profession of 5-14 years, have symptoms of a disease.

Increase in indicators on the frequency of the revealed arterial hypertension, a chronic rinopharyngitis, chronic bronchitis and tonsillitis at workers of foundry production is noted. The most safe against the background of other productions sewing production looks.

By results of profound medical examination of the working convicts the high frequency of arterial hypertension at workers of foundry, sewing production and the mechanical shop is revealed.

In the analysis of detectability of diseases at profound medical examinations depending on age obvious increase of number of cases of arterial hypertension is revealed with age. Connection of age and number of cases of chronic bronchitis with increase in age is proved.

The highest level of detectability of arterial hypertension takes place at faces of age group of 50-59 years – $46,4 \pm 6,6$ cases on 100 surveyed, reliable above, than persons have 40-49 years – $29,2 \pm 2,8$ ($P > 0,05$), 30-39 years – $18,3 \pm 2,5$ ($P > 0,01$), 20-29 years – $12,0 \pm 2,8$ ($P > 0,01$) cases (tab. 2).

Chronic rinopharyngitis came to light at workers of foundry production more often – 24,4 cases on 100 surveyed. Chronic tonsillitis was registered at workers of mechanical, foundry production and a woodworking more often. Chronic bronchitis was most widespread among working shops of mechanical and foundry production. Chronic pharyngitis was established at workers of the painting shop more often – 17,3 cases on 100 surveyed. The miopy thicket suffered in sewing production and on the painting site.

Results of profound medical examination of age group of 60 years are also more senior cannot be considered typical, because of its small number (only 4 persons), also as well as in groups where the size of a standard deviation (b), exceeded 20%. Detectability of chronic tonsillitis at persons up to 19 years made $10,5 \pm 7,0$ cases at the age of 20-29

years – 20,3±3,5 cases on 100 surveyed. If to unite these groups, the frequency of detection of chronic tonsillitis up to 29 years will make 19,0±3,2 cases that is reliable above, than among 30-39-year-old – 10,0±1,9 cases (P >0,05) and 40-49-year-old – 10,5±1,9 cases (P >0,05). The indicator of 50-59-year-old made (3,6±2,5 cases) – is atypical, and for group of 60 years and is more senior is incorrect because of small number of observations.

Frequency of the revealed chronic pharyngitis and rhinitis made 32,6±1,7 cases on 100 surveyed and, apparently of tab. 2, age indicators significantly do not differ (P > 0,05).

In the frequency of detectability of chronic bronchitis dependence on age of surveyed is accurately traced. So, among 30-39-year-old the indicator makes 9,2±1,9, 50-59 summer – 16,1±4,9 and 40-49-year-old – 17,2 ±2,3 cases (all on P >0,001).

Table 2: Frequency of detection of separate diseases at profound medical examinations depending on age of the working convicts in penal correction systems institutions on RT for 2014.

Age groups, years	Quantity, person	Name of nosology diseases, in cases on 100 of surveyed (M±σ) *			
		Arterial hypertension	Chronic tonsillitis	Arterial hypertension	Chronic tonsillitis
under 19	19	10,5±7,0	10,5±7,0	31,5±10,6	-
20-29	133	12,0±2,8	20,3±3,5	30,9±4,2	0,8±0,7
30-39	229	18,3±2,5	10,0±1,9	30,9±3,0	9,2±1,9
40-49	267	29,2±2,8	10,5±1,9	32,2±2,8	17,2±2,3
50-59	56	46,4±6,6	3,6±2,5	21,4±5,5	16,1±4,9
60 и >	4	50,0±25,0	25,0±21,6	25,0±21,6	50,0±25,0
Total:	708	23,4±1,6	11,7±1,4	32,6±1,7	11,2±1,2

Note: * - the crossed-out M±σ values with a standard deviation (σ) of the average size (M) exceeding 20% confirms not typicalness of the specified average size.

Studying of detectability of the specified diseases at profound medical examinations depending on length of service showed that the frequency of arterial hypertension is highest among persons with length of service of 20 years and more – 35,6±5,7 on 100 surveyed. At persons with length of service of 10-14 and 15-19 years indicators made 26,4±3,1 and 29,7±4,0 cases on 100 surveyed that does not differ from persons with an experience of 20 years and more (P > 0,05). Essential distinctions are available between the frequency of detectability of arterial hypertension for persons with length of service to the 1st year – 15,7±5,0 cases on 100 surveyed and 15-19 years – 29,7±4,0 cases (P >0,01), and also 20 years and more – 35,6±5,7 cases (P >0,01); and also between the frequency of this pathology at persons with an experience 1-4 years – 14,8±2,9 cases and with an experience of 10-14, 15-19 and 20 years and more (P >0,01) (tab. 3).

Table 3: Frequency of detection of separate diseases at profound medical examinations depending on length of service of the condemned UIN on RT for 2014.

Experience works, years	Number examined, person	Name of nosology diseases, in cases on 100 of surveyed ($M \pm \square$) *			
		Arterial hypertension	Chronic tonsillitis	Arterial hypertension	Chronic tonsillitis
under 1	51	15,7 \pm 5,0	13,7 \pm 4,8	43,1 \pm 6,9	2,0 \pm 1,9
1-4	142	14,8 \pm 2,9	13,4 \pm 2,8	34,6 \pm 4,0	9,2 \pm 2,4
5-9	120	18,3 \pm 3,5	12,5 \pm 3,0	29,1 \pm 4,1	10,8 \pm 2,8
10-14	197	26,4 \pm 3,1	10,7 \pm 2,2	28,0 \pm 3,2	12,2 \pm 2,3
15-19	128	29,7 \pm 4,0	10,9 \pm 2,7	35,0 \pm 4,2	13,3 \pm 3,0
20 и >	70	35,6 \pm 5,7	10,0 \pm 3,6	31,8 \pm 5,5	13,4 \pm 4,0
Total:	708	23,4 \pm 1,6	11,7 \pm 1,4	32,6 \pm 1,7	11,2 \pm 1,2

Note: * - the crossed-out $M \pm \square$ values with a standard deviation (\square) of the average size (M) exceeding 20% confirms not typicalness of the specified average size.

In detectability frequency at profound medical examinations of chronic tonsillitis, chronic pharyngitis and rhinitis reliable distinctions between age groups are not traced.

The displays of chronic bronchitis noted at workers with an experience to the 1st year – 2,0 \pm 1,9 cases considerably differ from an experience 1-4 years – 9,2 \pm 2,4 cases ($P > 0,05$); 5-9 years – 10,8 \pm 2,8 cases ($P > 0,05$) and 10-14 years – 12,2 \pm 2,3 cases ($P > 0,05$).

The analysis of frequency of detectability of diseases at profound medical examinations on professional groups revealed the following.

Frequency of arterial hypertension among workers of mechanical production made 24,7 cases whereas in sewing – 25,5, and in foundry – 33,3 cases on 100 surveyed.

Among the reasons which can cause the high frequency of arterial hypertension in sewing production first of all it is necessary to specify production noise. Together with functional frustration of nervous system (asthenic, astenovegetative syndromes, syndromes of vegetative dystonia) arterial hypertension makes essence of so-called "nonspecific effects" of impact of production noise on an organism of working. And, increase in arterial pressure always advances "specific action" of noise – development of neurotouch relative deafness.

At 28 people suspicion on occupational illness is established, at 20 workers relative deafness signs are revealed. In it there were, first of all, workers of sewing production (15 people). The pathology of respiratory organs connected with a profession is diagnosed for 5 people. Chronic hepatitis of the mixed etiology is revealed at 52, encephalopathy of various genesis – at 12 workers. Were the most widespread arterial hypertension (23,4% examined) and diseases of

the top airways – chronic rhinopharyngitis (13,8%) tonsillitis (11,7%), pharyngitis (10,2%) and rhinitis (8,6%). Also 11,2% of workers had clinical displays of chronic bronchitis.

At 323 (45,6%) workers new diseases are for the first time established; 2 (0,28%) the person were temporarily transferred to other work which is not connected with influence of adverse factors of production; 29 (4,1%) to workers are constantly employed on other enterprises. Following the results of inspection were directed to hospitalization 17 (2,4%) the person, 229 (32,3%) treatment in a dispensary is recommended to workers. 44 persons needed dietetics (6,2% from among examined).

Conclusion. The persons which are in places of detention represent a part of the general population. Most of persons from places of detention come back to society sooner or later and represent an important labor resource of the country. Therefore the health service of PU represents a special resource of public health care, allowing to carry out treatment and prevention of big group of diseases in complex target group, quite often hard-hitting for services of civil health care.

Sanitary and hygienic assessment of working conditions of convicts, identification of a complex of adverse factors of a working environment and labor process – a basis for development of sanitary and hygienic actions for optimization of working conditions and prevention of diseases at convicts.

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