

UDK 613.06.02-64

CONCEPTION FOR DETERMINING HIGH RISK GROUPS AMONG PRODUCTION STAFF WITH HAZARDOUS LABOUR CONDITIONS

V. Y. Solovyev

Federal Medical Biophysical center named after A. I. Burnazyan, 46, Zhivopisnaya st., Moscow, 123182, Russian Federation

The basis of the conception comprises suggestions on determining high risk groups (HRG) for production personnel with hazardous labour conditions and harmonization of safety standards in various spheres of human activity. A three-step system of social protection and medical help is offered to the staff. The first step is connected with labour conditions with HRG being formed depending on complex professional risk. As a complex of measures on social protection there were offered preventive and rehabilitation measures. The second step is providing specialized medical help including thorough early diagnostics for the staff on medical recommendations made on the basis of regular medical checkups. The third stage presupposes an opportunity of compensation payments or provision of other social benefits to employees with diseases based on identifying cause-and-effect relationships between labour conditions and diagnosed illness (insurance case). For the risks which are negligibly low in comparison with the total risk it's important to exclude from the evaluation the emotion factor which may lead to non-justified decisions. Experience, gained in the sphere of analyzing effects conditioned by radiation, might be effectively used for estimation and forecasting negative implications from a wide range of other, more significant (from the point of view of influence on health) industrial factors.

Key terms: risk group, conception, personnel, hazardous productions, social factor.

Introduction. Planned wide usage of new innovation technologies might be connected with appearance of new potentially dangerous for human health factors, in particular, nanotechnologies and products manufactured with their help. In connection with this, the modernization and improvement of the *social protection* system of personnel in potentially hazardous productions (which is considered one of the *risk management aspects*) is becoming particularly topical. The solution of this problem is to be realized in the conditions of limited financial and resource opportunities of the existing healthcare system. That is why the basis for an *effective system of health protection for personnel in potentially hazardous for human health productions* is objective criteria for *high risk groups (HRG)* formation which are united under the general

conception of decision-taking on measures of *medical* and *social* protection.

From the standpoint of medicine and hygiene of labour, the assessment of professional risk includes studying the factors of production environment and labour process as sources of potential danger for health, determining quantitative patterns of professional diseases and development of preventive mechanisms and measures. This approach is reflected in defining a professional risk offered by WHO.

Currently the methodology of risk assessment is one of the most important tools of social-hygienic monitoring. Within the framework of the task of health preservation and professional longevity of personnel with hazardous labour conditions the high risk group consists of *people working in hazardous la-*

bour conditions whose expected or observed frequency of undesirable effects in health condition exceeds or might exceed the frequency of professional groups not involved into hazardous labour.

The given definition is to be considered general and might be specified for any affecting production factors with specification of direct adverse influences on the health condition of employees.

It's necessary to differentiate between *retrospective predictive individual* risk evaluation and *post-factum risk evaluation*. In the latter case we imply retrospective assessment of risk for dead (taken ill) people in the past for revealing cause-and-effect relationships between the source of adverse impact on a human-being and death (disease). The main aim of such evaluation is settling down the issues of social protection in the form of compensation for the damage to health or life. Predictive risk assessment is the assessment of risks for the people living in the present time. Its goal is to provide a quantitative basis for decision-taking on medical measures and social protection in the conditions of limited resource opportunities. Social protection in this case is *not in the compensation for the damage*, but in the compensation for *increased risks*. This compensation can be in the form of additional personalized medical service, payments for additional life or health insurance or additional *social payments* and/or *benefits*.

According to WHO data, more than 100 thousand chemical substances, 200 biological substances, about 50 physical factors and 20 labour condition factors affecting a human-being in numerous combinations and expositions form different types and levels of potentially risky situations. Thus, specialists of International Labour Organisation (ILO) and WHO single out over 150 classes of professional risks and about 1,000 of their types which represent a real danger for about 2,000 various professions. At the same time it is considered that this classification is not exhaustive and comprises only separate aspects of labour safety and hygiene.

In this work [3] we offer a conception for identifying high risk groups among the personnel of nuclear branch. In this work this approach is adapted with respect of any productions with hazardous and extremely hazardous labour conditions including presence of several hazard factors.

Conception wording. In modern conditions the usage of effective methods of early diagnostics for professionally conditioned and socially significant illnesses allows to perform formation of HRG on the basis of medical recommendations taking into account age. Recognition of multiple factors and causes of those illnesses will allow to estimate the impact of adverse production factors adequately and give a system labour conditions assessment. It is worthwhile mentioning that from the point of view of safety regulations culture *professional health* is the most important criterion and basic component of secure exploitation of potentially hazardous for human health objects.

It should be noted that when assessing risk using model concepts only recommendations reflecting *an agreed and unanimous opinion* of competent international and national organizations are used. Though there are numerous publications of certain authors or author teams making suggestions on improvement or changing the models, *their consideration and recognition at the national and international levels* are crucial for the reasonable and justified application of their results in the sphere of risk assessment.

It seems quite reasonable to form HRG *on medical recommendations* in combination with *the complex usage of modern methods of early diagnostics, rehabilitation and qualified treatment*. This will allow to compare indicators of professionally conditioned and socially significant diseases with complex impact of production hazard factors and adequately estimate the significance of the studied component of a factor. From this point of view non-specific disorders connected with *psychological tension of work* and decreasing the level of *professional reliability* of staff become of great importance. This, probably, is one of the main reasons for developing somatic and, in particular, *cardiovascular*

pathology occupying a significant place in the picture of diseases of personnel with hazardous and extremely hazardous labour conditions.

From the point of view of *social protection* system improvement and *medical help* to personnel with hazardous labour conditions in modern conditions it is considered reasonable to develop an approach based on a complex analysis of labour conditions [1, 3].

The offered approach is based on scientifically proven selection among personnel of such high risk production groups based on *sanitation and hygienic and medical criteria*. It is based on a complex analysis of labour conditions, and the selection among personnel and veterans of the branch is conducted on the grounds of *sanitation and hygienic and medical criteria*. Such criteria might be effectively used for comparing employee's health condition with the labour conditions, control of labour conditions and evaluation and accreditation of workplaces in order to establish levels of professional risks, develop preventive measures, investigate the cases of professional diseases and justify the measures of social protection and establishment of priority in conducting rehabilitation measures as well as their efficiency evaluation. This approach will allow to ensure a complex of measures on personnel social protection with the account of economic opportunities on the whole, insurance medicine and a particular enterprise, it won't create a disproportion between the resources spent and the effect expected and also will exclude decisions which might potentially cause social tension.

In accordance with the adopted hygienic criteria and factors of potential hazards, labour conditions are classified into the *appropriate, permissible and hazardous* [1]. As impacting factors of the production environment there considered: radiation, chemical, biological ones, noise, vibration, ultrasound, output of nanotechnological production and others. In the given terms HRG consists of the personnel whose labour conditions are related by the level of impact of one or more production factors to hazardous.

Till the present time the main tool of hazardous labour conditions impact assessment on the health of workers has been *hygienic stand-*

ards. Exceeding those is considered as a breach of sanitation legislation and is taken into account when defining protection measures of social and economic character. However, the focus here is laid on *compensation measures* but not on the decrease of potential risk levels. That is why it's reasonable to move on to complex assessment of labour conditions based on the factor analysis of production environment (hygienic, psycho physiological criteria) and establishment of *medical criteria of health breaches* as a result of professionally conditioned diseases.

The results of such an analysis might become the ground for systematic management of professional risk with the account of *social, medical, economic and organizational* factors.

In the system of *professional risk management* three groups of subsystems might be singled out: *monitoring, prevention and social protection*. When defining the level of professional risk the labour conditions assessment at workplaces under hygienic criteria has a predictive character and is to be complemented with the assessment of factual impact using medical and statistic indicators of the level of professionally conditioned diseases and seriousness of their consequences.

Development of the system of compulsory social insurance from accidents on the production site and professional diseases proves that the realization of compensational function has been implemented to a great extent. As for the preventive and rehabilitation functions, they are to be implemented still. Taking into account international experience it seems reasonable to create a system of preventive measures aimed at reducing the levels of professional risks including:

- ranging (by types and levels) professional risks from the point of view of their permissibility for the society, state and particular professional groups in accordance with the following classification: - *permissible at no event*; - *permissible in extreme situations*; - *permissible on condition of availability of effective team and individual protection means*, regular monitoring of health condition of workers and observation by employers and employees of the

required regulatory measures on personnel protection; - *permissible* on condition of observation of rules and instructions on safety regulations, labour hygiene and regular monitoring of production culture and workers' health;

- developing the methodology of the complex professional risk assessment for various production factors, labour process and first forms of workers' health deterioration;

- forming a team of experts on professional risks to secure the risk assessment and develop recommendations on reducing the levels of risks as well as optimization of their impact degree distribution in time.

Such a system will allow to assess adequately the significance of a singled out factor in the structure of professional risks and compare it with the impact of other adverse factors. It becomes of particular importance when it comes to the question of social benefits and, possibly, compensation payments for the personnel with professional diseases.

General provision on harmonization of safety standards for various production factors threatening and endangering the health of personnel and population are explained in the work [2]. Also there's given an algorithm for accurate accounting of several hazard factors influencing simultaneously or at different periods of production activity.

It should be outlined that from the point of view of safety culture *professional health* is the most important criterion and basic component of secure exploitation of objects with hazardous and extremely hazardous labour conditions.

Formation of HRG on development of professionally conditioned and socially significant diseases should be performed on *medical recommendations* in combination with the complex usage of modern methods of early diagnostics, rehabilitation and qualified treatment.

In order to take decisions on providing medical measures and social protection of personnel it's necessary to consider all the components of risk as well as the balance of risks and benefits. It's necessary to implement the system of unified perception of existing and potential risks. Such a system might eliminate numerous

contradictions in evaluations of danger of many hazard factors and facilitate better understanding of their importance [2].

In modern labour conditions for the risks which are negligibly low in comparison with the total risk it's important *to exclude* from evaluation *the emotion factor* which may lead to unreasonable individual and team decisions.

Experience obtained in the sphere of analysis of effects caused by radiation can be efficiently used for evaluation and predicting negative implications from the impact of a wide range of other, more significant from the point of view of their influence on health, industrial factors. The methodology of development of a balanced approach to the safety regulation in various spheres of human activity is described in depth in the work [2]. According to the suggestions made in the work, the basic universal safety norms for limiting the chronic impact of regulated hazard factors using the universal risk indicator are: 0.0004 for population and 0.006 for professional workers. Those indicators are chosen by the authors so that they could correspond to the modern norms of radiation safety in the regular mode of companies work and usage of nuclear radiation sources which provide a relatively high level of human health protection in the regular working mode with those sources. Besides using risk evaluation for establishing and justification of safety norms are deeply developed in the sphere of radiation safety in particular.

Conception of permissible risk stems from the thesis about absolute impossibility of complete elimination of professional risk in the process of labour activity and requires, on the one hand, evaluation and definition of *levels of 'permissible risk'* and on the other hand, measures on excluding *extreme or 'non-permissible risk'*. For this the monitoring of production environment condition and labour process are to be complemented with methods of health and working ability of employees assessment and establishment of interconnection between the labour conditions and a possibility of professional diseases.

With the aim of improving the system of social protection and medical help to the per-

sonnel of hazardous and extremely hazardous labour conditions in modern world it is offered to develop an approach based on formation of HRG by hygienic criteria and medical prescriptions which is described in the work [3] in respect of nuclear industry personnel. There's been offered a three-step system of social protection and medical help to the personnel of productions with hazardous and extremely hazardous labour conditions.

The first step is connected with *labour conditions*. Here HRG are formed depending on the overall complex professional risk. As a complex of measures on social protection here is *preventive and rehabilitation measures*.

The second step is provision of *specialized medical help* including *a thorough early diagnostics* for the personnel on medical recommendations which appeared on the basis of regular medical checkups.

The third step presupposes an opportunity of *compensation payments* to the employees who have fallen ill. This is based on analyzing cause-and-effect relationships between labour conditions and diagnosed disease (insurance case).

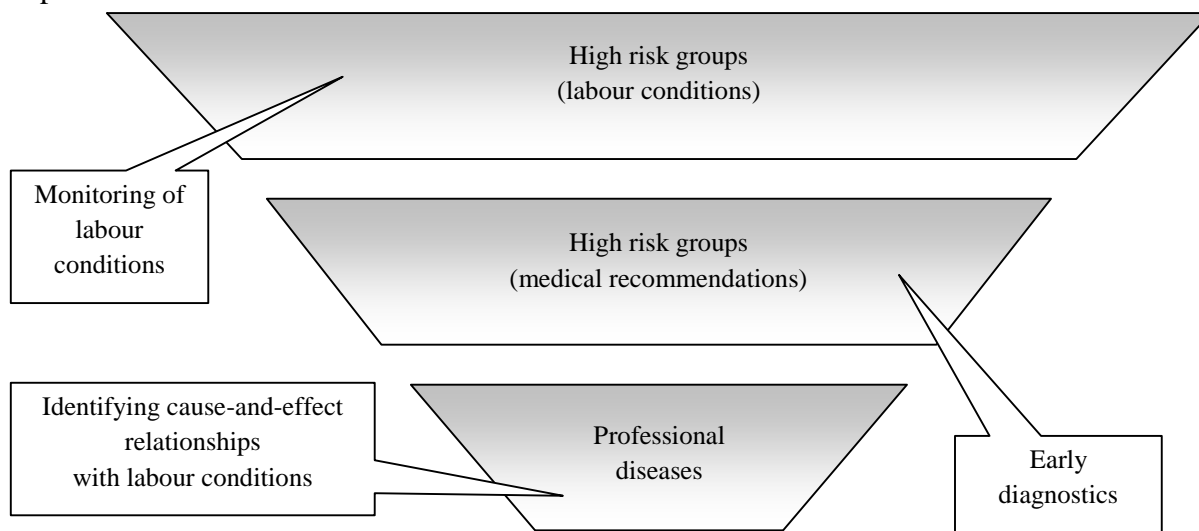
For provision of functioning of the second and third steps it would be reasonable to employ the possibilities of insurance medicine.

The scheme of this 3-step system of social protection and medical help to the personnel of productions with hazardous and extremely hazardous labour conditions is represented in picture [3].

Formation of HRG as the first step is performed on the basis of the complex analysis of labour conditions using sanitation and hygienic criteria in terms of production risk.

As a complex of measures on social protection for the personnel of the branch working in hazardous and extremely hazardous labour conditions there are *preventive and rehabilitation measures*. The complex of such measures is elaborated with account of economic possibilities of enterprises and/or the branch in general. Singling out HRG in this case can be realized for targeted support of workers with hazardous and extremely hazardous labour conditions through *extra payments and/or social benefits*.

The procedure of conducting in-depth medical checkups is to be carried out only under *medical recommendations* for the personnel with certain disorders in health condition detected in the course of regular medical checkups.



Picture. The scheme of selection of high risk groups for workers with hazardous and extremely hazardous labour conditions based on the complex assessment (adapted from [3])

The same relates to the provision of *specialized medical help* to professionals with diseases. In

this case labour conditions are not of deciding importance. HRG are formed as a result of regular medical checkups.

The algorithm for determining cause-and-effect relationships between labour conditions and diagnosed disease (*insurance case*) is to be agreed between the employer and hired personnel which is reflected in the relative documents and in the *collective contract*. This algorithm may be created based on the analysis of the complex professional risk [1].

At the stage *before adopting regulatory documents* on the issue of social support for the personnel of productions with hazardous and extremely hazardous labour condition the algorithm of assessing cause-and-effect relationships of professional diseases can be the subject of an *agreement* between an employer and personnel. With its help it's possible to predict personalized list of employees belonging to HRG. The formation of such groups is rational at the stage of elaboration of quantitative criteria for determining the size of insurance payment to the workers with professional diseases (in case such an algorithm is adopted) which might be connected with the condition of labour activity in the situation of limited economic possibilities. The implementation of this provision is to be assigned to insurance medicine.

Conclusion. It seems rational and reasonable to implement a system of unified perception of the existing and potential dangers in the enterprises with hazardous and extremely hazardous labour conditions. This system might *eliminate* many *contradictions* in the assessment of potential danger from impact of hazardous production factors and promote better understanding of their significance.

For taking decision on providing the measures on medical and social protection of personnel it's necessary to take into account all the elements comprising risk as well as the balance of risks and benefits.

Formation of HRG on development of professionally conditioned and socially significant diseases is to be performed on *medical recommendations* in combination with complex usage of modern methods for early diagnostics, rehabilitation and qualified treatment.

For the risks which are negligibly low in comparison with total risk it's important to *exclude* from the assessment procedure *the emotion factor* which may lead to unjustified decisions.

Experience gained in the sphere of analyzing the effects caused by radiation might be effectively used for assessment and prediction of negative implications from the impact of a wide range of other, more significant, from the point of view of influence on health, industrial factors.

References

1. P 2.2.755-99. Hygienic criteria of assessment of labour conditions and workplaces classification according to the indicators of danger and hazard factors of production environment, heaviness and intensity of labour process [Electronic resource]. http://www.znaytovar.ru/gost/2/R_2275599_Gigienicheskie_krite.html (reference date: 04.07.2013).
2. Demin V. F., Romanov V. V., Solovyev V. Y. Balanced approach to the safety regulation in various spheres of human activity // Med. radiol. and radiats. Safery. — 2012. — T.57, #5, — pp. 20—30.
3. Solovyev V. Y., Bushmanov A. Y., Semenov V. G., Kochetkov O. A., Toburanov F. S. Conception of singling out groups of high risk among the personnel of nuclear branch // Med. radiol. and radiats. Safery. — 2009. — T.54, no. 6. — pp. 16—23.