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OCCUPATIONAL MEDICINE AT THE VERGE OF THE TWENTY FIRST CENTURY: EVALUATION OF ACCOMPLISHED AND EXPECTED CHANGES IN THE PREVENTIVE APPROACH

JANUSZ A. INDULSKI

The Nofer Institute of Occupational Medicine
Łódź, Poland

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Abstract. The World Bank in its document under the title 'Investing in Health' (1993) states that the health status of the population, including the working population, and working conditions in individual countries depend essentially on the value of gross national product per capita. The attitudes towards the role and objectives of occupational medicine have changed significantly over the last three decades. A high priority given to primary prevention reflects the mainstream of a new approach to preventive measures. Advancements in technology, production and services, common use of computers and flattening of work organisation structures have brought about the need for workers' active participation in planning of activities and shaping working conditions in own enterprise. At the same time, workers are required to possess much higher qualifications facilitating their participation in applying new technologies and using new information systems, which resulted in a fierce competition on the labour market.

In the countries in the political, social and economic transition, the conditions for introducing a new system of sustained development, described by Gustavsen at the 25th International Congress on Occupational Health have not as yet been established. A procedure-based system involving negotiations between employers and workers' representatives failed to be successful in improving working conditions as the roles of the state, employers and trade unions had not been defined precisely. It is expected that further health promotion at the worksites in these countries will depend mainly on the economic progress and the reformed system of education.

Recent developments in new technologies, bearing sometimes the name of the second industrial revolution, have begun to change considerably well-established views on the role and objectives of occupational medicine. This is particularly visible in highly industrialised and developed countries. Although Poland has not as yet joined this group of countries with high gross national product, a general opinion

Address reprint requests to Prof. J.A. Indulski, The Nofer Institute of Occupational Medicine, P.O. Box 199, 90-950 Łódź, Poland.

does exist that it is a country of the paramount potential and great opportunities for rapid economic and social progress in 15–20 years to come. Undoubtedly this progress is closely associated with various processes which are now under way in this country and are aimed at reaching the status of the member State of the European Union through strengthening economic and political ties and consistent adherence not only of the national economy mechanisms and technical infrastructures, but also of legislation with special concern for national environmental protection. In order to bridge the gap between the eastern and western halves of Europe, and to bring closer our structures to those adopted by the European Community, it is urgently needed to modify also the systems of social insurance, health insurance and health care, including health care of the working population, namely the structures with social and economic dimensions.

By virtue of the Resolution adopted by the World Health Assembly on 26 May 1996, the issue of health care of the working population became the subject of the World Health Organization's Programme named: 'Health for All Working People by the Year 2000'. Bearing in mind the lower standards of living in Poland compared to those of economically developed European countries, the implementation of many adhering processes in the social field will probably be delayed beyond the date of Poland's accession to the European Union.

Trying to predict the changes in occupational medicine both in its research and practical spheres, expected to occur during the coming decade, conditioned by transformations in the national economy, and changes in its structure and already modified organisation and methods of work in certain companies and enterprises, it seems advisable to look at some events which have already shaped this area of activity in countries of high economic standard. First of all, changes in the economic structures, characterised by a constant transfer of manpower from manufacturing sectors to services, already accomplished in those countries, should be considered. In some rich countries, services employ about 70% (USA) of the whole working population, whereas the mean figure accounts for 42% (5). The workposts have become more diversified, and the proportion of part-time workers or those employed on the basis of short-term contracts has increased. The differences in the organisation of work and in ways of its performance are noticeable. These changes have been stimulated by free market competition, the expanded automation of workposts, many production-line tasks performed by robots and the broad application of information technologies (11). Computers are used not only to control technological processes but also to perform office, planning and managerial work. These developments vary in different branches of economy, and they generate far-reaching variations in the character of work and individual workposts as well as in occupational exposure. These changes are not so dramatic in the production sectors which depend on nearby natural resources, such as agriculture, forestry, metallurgy and the extractive industry. Although these branches of the national economy have to acquire new technologies and introduce certain changes in work organisation in order to increase own capacity and output, conventional way of work still predominates so that occupational safety and health problems and occupational hazards remain almost the same.

Generally speaking about the production sectors in industrialised countries where workers' wages are high and stable, tendencies towards lowering production costs and limiting barriers of international exchange of goods accelerated the

introduction of new, more efficient manufacturing technologies together with concurrent changes in the type and organisation of work.

In the service industries the role of workers changes gradually as a result of the interaction with the system of the computer control. In the manufacturing sectors production facilities have been decentralised due to two different mechanisms. The first one involved the system based on the production of components of a given final product by small cooperating enterprises. The other one involved the transfer of certain types of production to developing countries either because they were hazardous to the environment or due to lower labour costs and frequent tax privileges. In addition, the establishment of corporations in industrialised countries, acting as international industrial and trading blocks, has contributed to the promotion of changes in the production methods. For of various reasons, the management of working conditions is not always harmonised in such a block which functions in many different countries, not mentioning the lack of harmonisation between industrial and trading blocks themselves.

This arrangement raises the problem, namely in cases of industrial investments located in less developed countries, and accomplished most frequently by industrial and trade corporations, that working conditions, occupational safety and hygiene standards do not correspond with those already achieved in the developed countries. It should be also stressed that the transfer of new technology changes considerably the organisation of work and the means of its performance, increasing at the same time the requirements concerning the workers' qualifications and education and also their attitudes towards their own production responsibilities. It also alters the level of work load and occupational hazards.

The physical dynamic work load has been gradually and broadly replaced by a static load. The application of informative systems in the manufacturing processes and in services resulted not only in greater workers' workload due to the information flow but also in their greater responsibility for activities undertaken. Both these factors generated changes in the pattern of diagnosed occupational diseases, towards the enhanced incidence of diseases of the locomotor system and effects of occupational stress related also to the increased speed of work. Rantanen (11) states that in enterprises employing new, effective technologies, 30–60% of workers report great psychic load and discomfort defined as the time pressure syndrome.

Workplaces vary in their character but also individual operations are more complicated even at the same workpost. The variety of production facilities and technological processes have contributed to a complex interaction between man and technology and to a possible occurrence of processes which might get out of control. Such a situation imposes the need for permanent concentration of workers' attention, creating at the same time an additional psychic burden.

A great human ability to cope with changes occurring in the production processes is well known but it differs considerably depending on the individual personality, age and education. If a worker fails to cope with changes, then he is exposed to stress which in turn affects interpersonal relations. The progress observed in production technologies increases the requirements addressed to workers and intensifies the competition not only in economic terms but also in the labour market. In the opinion of some authors (1) regardless of the political system in certain countries, resistance to changes in working conditions can be observed. Moreover, theses changes may be found undesirable because of intensified competition.

All the data available provide evidence that highly developed countries, despite alterations introduced in manufacturing and service technologies and in work organisation, fail to reduce the incidence of occupational diseases and accidents at work to the level that could prevent social and economic consequences of great concern. Some of the USA data published during the recent two years confirm this observation. Lemen reports that at present about 10 million injuries, acute enough to require medical interventions, and 400 thousand occupational diseases are diagnosed annually, although a twofold reduction in the number of deaths (from 14 000 to 7000) at workplaces proved to be possible during the years 1970–94 (7). Even more spectacular observation was reported in the article published by the US National Institute of Safety and Health (9). It says: "Each day, an average of 137 indivduals die from work-related diseases, and an additional 16 die from injuries on the job. Every 5 seconds a worker is injured; every 10 seconds a worker is temporarily or permanently disabled. In 1994, occupational injuries alone cost $121 billion in lost wages and productivity, administrative expenses, health care, and other costs. This figure does not include the cost of occupational illnesses. Clearly, work injury and disease create substantial human suffering and place a heavy burden on the U.S. economy".

Most likely the range of health effects of hazardous working conditions, depending on the industrial development and the economic structure, is similar in other developed countries throughout the world, despite energetic attempts to promote prevention and to modify attitudes towards preventive measures. All these changes were initiated in the early 1970s and finally they became well-grounded in the early 1990s. The change in the attitude towards preventive measures involved shifting the emphasis from secondary prevention to primary prevention, that is to all measures designed to prevent the occurrence of pathologies indicating the onset of the disease or health impairment (8). Obviously, the change in the attitude towards the preventive means does not undermine early diagnosis and rehabilitation. The point is that the emphasis has been shifted from the detection of health effects to the eradication or reduction in the causes or factors contributing to their occurrence.

The phenomena observed have contributed to the change in attitudes towards occupational health and safety of the working population. The success of Japanese economy achieved *inter alia* due to reducing the number of levels in organisational structures in industry and services as well as to ensuring active participation of workers in manufacturing processes and in creating appropriate working conditions at individual workposts proved to be a major stimulus to changes in attitudes. Although, the first extremely rapid increment in gross national product has increased the occupational risk for workers, but further progress and stabilization have furnished a significant improvement in working conditions so that Japan can be considered to enjoy now one of the best established working environments (10). The progress has been achieved also due to a high level of education in society, safety and health promotion programmes at schools and enterprises, as well as to testing of new chemicals and new technologies, prior to their introducing to production and use. In Japan the programme of occupational stress control was initiated by the Minister of Labour already in 1975. In 1989 the Japanese government adopted a comprehensive health protection programme, including the Total Health Promotion Plan. The Plan promoted education of six different categories of specialists: occupational health physicians, industrial nurses, instructors

in health promotion, health service managers, occupational dieteticians and industrial psychologists (10). These developments have contributed to essential improvements in working conditions and in the health status of the working population. It should be added that in Japan and other developed countries, a rapid advancement in workers' qualifications adjusting them to cope with new technologies and work organization has been ensured by an adequate system of incentives and decent wages compensating the costs of education.

One of the keynotes of the 25th International Congress on Occupational Health (1996) was devoted to changes in the attitude towards workers' health care (2). In the author's opinion promotion of occupational safety and health can be presented in the form of three different systems:

1. A criteria-based system with threshold limit values, as the core example MAC, MAI etc.;

2. A procedure-based system where improvements are sought through the way in which the local health and safety efforts are structured. Here, the line organisation – in combination with the ordinary representative democracy – are the main actors; and

3. A system based on the idea of development, or continuous improvement so that decisions can be taken at the level of small groups of workers, initiatives stimulated and various forms of activities for higher productivity and better safety and work hygiene promoted.

The third system has developed from the Japanese experience and it is now being introduced in Scandinavian countries, particularly in Sweden and Norway. It also resembles the concept of future workplace after entering the twenty first century, especially in countries very much advanced in the economic and social development.

From the historical point of view, the old system based on the threshold limit values whose origins date from the period preceding World War II became ineffective already in the sixties despite its apparently positive features and contribution to profound progress in working conditions.

According to Gustavsen (2) the following positive features of this model should be underlined:

"– Health and safety problems could be posed and solved in a precise form demanding little subjective judgment,

– This, in turn, made it possible to "de-politicize" the issues, remove them from the day by day struggies often characterising workplaces in the earlier phases of industrialisation,

– It made it possible to further develop a public policy in the field without breaking such demands as for equal treatmant of all workplaces,

– The objectification of the issues made it possible to expand the public labour inspection without the public losing its role as an arbiter between interests,

– Finally, it became possible to develop occupational health resources without these resources losing their professional neutrality".

It should be admitted that the system based on hygienic standards was convenient both for the state administration and employers and for services supervising working conditions, reducing their interventions in matters of working conditions to factors subject to standardization. It was, however, not able to solve more complex and delicate questions related to the working environment and the

work itself, since not all factors which may exert impact on workers' health: productivity of labour, working abilities and quality of life (not only occupational life) can be standardized. Moreover, the research which has progressed produced evidence that the established standard values for chemical and physical factors present in the working environment have to be continuously supplemented and revised. This is due to the fact that standard values set forth to date do not embrace all occupational factors potentially hazardous to health. In addition, it has frequently appeared that following the standard values it was not possible to protect workers from the effects of longterm occupational exposure to these harmful factors and from their adverse effect on the course of acquired or genetically conditioned diseases.

It was rather difficult to standardise factors responsible for the exhaustion of the organism during long-lasting monotonous work, and factors which induce physiological and mental disorders related to work, its organisation and psychosocial climate at work places. It was also difficult to predict the interaction between different factors and their synergistic effect when applying hygiene standards. The old model has finally hindered further progress, however, some of its elements remain still valid.

A depreciation of the system based purely on criteria also resulted from the changed attitudes towards the work place considered no longer as the place of fight or combating various difficulties but as the place where an adult person spends one third of his/her life and hopes to fulfil expectations and satisfy professional ambitions. This system has been modified and gradually replaced by the system of rational conduct, following the scientific progress, and conditioned mainly by negotiations between an employer and the workers' representatives. This system functioned more effectively than the former one, and it did not limit further development of hygiene standards. It was conditioned by several following factors: it ensured more comprehensive evaluation of working conditions and their health and social effects; broader knowledge among workers' representatives of problems related to the working environment, structure and organisation of work as well as better awarness of physiological, psychological and sociological processes generated in work places; and the opportunity for major partners in the work place, namely employers and workers' representatives to benefit from various sources of information and the experts' experience and advice.

A procedure-based system has replaced the concept of control of workers by the idea of representative democracy. Its effectiveness in questions concerning health care was dependent on the hierarchy of organisational structures adopted and the procedures of negotiation applied. It was, however, conditioned by several important factors:

1. Legal regulations which not only impose the responsibility for all work-related adverse health effects (including civil litigation) on employers but also provide for economic incentives to take measures aimed at eliminating causes of occupational and work-related diseases and those generating accidents at work.

2. The appropriate role of the state as an arbiter trying to settle divergencies between interests of employers and demands of trade unions.

3. The appropriate action and role of workers' representatives, namely of trade unions whose major concern should be directed to working conditions and not to 'great politics' as it is often called. This approach requires, however, new

competence and skills to utilize information as well as knowledge and experience of experts.

4. A relevant scientific infrastructure so that significant problems within the area of occupational health could be tackled and solved.

5. The establishment of information systems facilitating occupational risk assessment in view of new technologies and work organisation and performance as well as reliable evaluation of working conditions, occupational exposure and health effects.

These two systems: one based on hygiene standards, and the other called procedural model reflect the approach to issues of occupational medicine most frequently observed in the world. However, their concrete form depends considerably on the social, economic and cultural development attained by individual countries. The states which continue to undergo an array of political, economic and social changes belong to a group of very specific countries, mainly due to differences between existing and changing legislation in the area of labour and working conditions, and the reality found in practice. The problem is that the roles of main partners interested in working conditions: employers, trade unions and state authorities, have not as yet been specified as to ensure an effective and concerted action.

Systems for occupational safety and health promotion existing to date together with a paramount scientific progress concerning the mechanisms responsible for the effect of risk factors, risk assessment and preventive measures highlighted the significance of the research infrastructure and the role of experts in this field as well as the need to establish international information systems and to utilize them. This results from the fact that the bulk and variety of information, the way it is evaluated and interpreted, and a growing body of specialistic knowledge go far beyond the capacity of the assimilative faculty of individuals involved in business management, even those who possess very good education in other fields. In highly developed countries, and in so called 'wise societies' courts are not willing to charge persons who, as a matter of fact, are legally responsible for given events but who are not able to fully understand them (2). But there always is an open question whether they have used expert's knowledge and advice in those particular cases. Regardless of the kind of existing preventive models, in the opinion of some international institutions, the gross national product in individual countries exerts a decisive impact on the level of occupational safety and hygiene, the volume of related social and economic losses, the wages and the functioning of the social security systems (12). It is well known that the requirements of the World Health Organization as to the organisation and improvement of health services, addressed to individual countries, vary depending on the level of their social, economic and educational development. Thus, a conclusion can be drawn that further progress in the standard of working conditions depends entirely on the economic development of a given country and on the living standards of its citizens. As depicted in the Report 'Investing in Health' published for the World Bank (12) a reduction in poverty and a high level of education are prerequisites for health. If one only looks at the data presented by J. Jeyaratnam during the International Congress on Occupational Medicine held in 1996 (4), then it will become clear to what extent the wages of different groups of workers vary depending on the economic progress attained by particular countries. This is, of course, reflected in the living standard of different populations. Therefore,

hygiene norms adopted by different countries should be adjusted to the level of their economic development. Bearing in mind all conditions involved it should be concluded that mandatory normative values should be very realistic, kept within the feasible limits, and they should not hinder further economic development of a given country.

The questions how hygiene standards function and how they are set forth have been already presented in many publications, however, their historical and methodological perspectives are thoroughly discussed by J.A. Indulski in 'Setting of Environmental Standards', one of the sections of the textbook entitled 'Occupational Health in National Development' (4). Nevertheless, one question which is usually neglected should be raised here, together with historical and methodological perspectives, two dimensions of this issue should be considered, namely ethical and pragmatic ones. From the ethical point of view, a proposed standard value should ensure, according to the knowledge available, safe working conditions for all workers and protect them and future generations from undesirable health effects. Such standard values are often developed by relevant groups of experts and presented as a proposal. A pragmatic dimension imposes procedures which involve a temporary adherence of standard values to current technical, technological and economic conditions, making feasible their practical functioning in existing enterprises. The negligence of the pragmatic dimension leads to the situation in which settled standard values remain only in the written texts of legal regulations, a phenomenon which is still observed in many countries. There is an opinion, confirmed by numerous facts, that hygiene standards set only in view of workers' health care, what happens in countries with low national income, are most frequently considered as target standards (3). This problem is controversial and a lot of dicussions are still going on. Nevertheless, it is hoped that an indispensable, positive compromise, ensuring continuous progress along with the development of new opportunities, will be finally reached.

During the 1980s and 1990s new ideas began to emerge together with a new model for health promotion and occupational safety, better adjusted to the concept of a future work place 2000. This model involves active participation of workers in the development of the enterprise and establishment of their own supportive and friendly worksite. Among its positive features the following ones deserve special mention:

– providing workers with the opportunity of shaping and organising their own work place stimulates and motivates them to active participation in the enterprise development and displaying initiatives to introduce changes ensuring higher productivity and satisfactory safety and hygiene standards;

– the changes introduced strengthen the ties between workers and their workposts and worksite, their motivation to keep the job promotes the production and better working conditions;

– the modification of the work organisation helps to disclose and eliminate instantly all shortcomings and weak points in technological processes;

– a new system stimulates workers' imagination and enhances their abilities to cope with unexpected changes.

Such a system involves workers in taking a broad range of decisions having a positive impact on their safety and health. A described model of sustained development providing the ground for shaping the vision of the future work place

may take different forms in individual countries. The differences may depend on culture, habits, traditions and mutual relations between employer and employee. Nevertheless it has appeared that the model initiated in Japan has been, despite differences in culture, successfully applied in big concerns, especially those involved in the motor industry, both in eastern and westen countries. The Nordic countries were first to start the promotion of this model. In the opinion of the author, the future work place has been presented in the most convincing way in the 1995 publication of the Finnish authors (5). They state that "the rapid development of manufacturing technology has not led to the emergence of completely automatic, unmanned factories. The proportion of human labor has decreased but simultaneously also the work has become more exacting. The know-how and decisions of individual workers have a greater impact on the safety, quality, and productivity of work than ever before. For many reasons, the future workplace is different from traditional workplaces. On the one hand, people are better trained than before, on the other hand, production systems, machinery, and equipment are becoming more and more complex.

International trade and competition require ever more efficient production and more sophisticated products. These changes seem to have a great impact also on the future jobs and work organizations. Company organizations will become flatter and workers will form small teams, which will be largely autonomous in deciding how to perform a piece of work. Attitudes towards work are also changing. Particularly the young people demand pleasant and safe work conditions, while the work itself should provide variety, interest, and independence.

Also, the need to integrate safety with the rest of company operation is obvious. Therefore one needs to know how to integrate safety with company maintenance, production design, and quality enhancement in general.

Active participation by employees in the planning of their own work is one way to improve work safety. The role of employees is indeed changing from that of passive recipients of information and objects of protection to that of active decision-makers largely responsible for their own safety and health. Moreover, the versatile application of employees' know-how is going to be a precondition for productive operation in the future markets".

As presumed, the implementation of the presented vision of the future workplace, taking probably different forms, is more feasible in economically developed countries, with high level of education, technical and technological progress, and political stability. That requires social discipline and 'work culture' conditioned both by the well-established traditions and the educational and training systems. Developing countries and those undergoing political and social transformations will have to bridge the gap and they will require more time to cover the existing distance, however, the transfer of new technologies, modification of work organisation, higher qualifications demanded from workers and educational reforms may accelerate considerably the whole process.

The change in approaches to the issue of prevention entails not only the need to modify the worker's role in the enterprise, but also to change the attitude to services supervising working conditions and to occupational health services. It is necessary to prepare employers and employees for new roles and develop their skills to solve problems concerning health, safety and maintaining workers' good health condition throughout the whole working age. There is a need to expand the range of issues

tackled by occupational medicine understood in its scientific and preventive meanings in order to encompass phenomena which cannot be regulated by legal rules but which affect health, work ability and workers' skills to cope with technological and organisational changes. To this end it is also necessary to modify the attitude to so called work-related diseases, that is to factors which accelerate and aggravate the course and symptoms of other diseases genetically conditioned and related to the effect of occupational factors and lifestyles. That will impose the need to evaluate the health effect of occupational factors and to expand the list of traditional occupational diseases according to opportunities provided by economic and social development of the country.

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