

STANDARDS, PRINCIPLES AND APPROACHES IN OCCUPATIONAL HEALTH SERVICES

Jorma Rantanen, Igor A. Fedotov

This article is based on the standards, principles and approaches embodied in the ILO Occupational Health Services Convention, 1985 (No. 161) and its accompanying Recommendation (No. 171); ILO Occupational Safety and Health Convention, 1981 (No. 155) and its accompanying Recommendation (No. 164); and the Working Document of the Twelfth Session of the Joint ILO/WHO Committee on Occupational Health, 5-7 April 1995.

The ILO Occupational Health Services Convention (No. 161) defines "occupational health services" as services entrusted with essentially preventive functions and responsible for advising the employer, the workers and their representatives in the undertaking on the requirements for establishing and maintaining a safe and healthy working environment which will facilitate optimal physical and mental health in relation to work and the adaptation of work to the capabilities of workers in the light of their state of physical and mental health.

Provision of occupational health services means carrying out activities in the workplace with the aim of protecting and promoting workers' safety, health and well-being, as well as improving working conditions and the working environment. These services are provided by occupational health professionals functioning individually or as part of special service units of the enterprise or of external services.

Occupational health practice is broader and consists not only of the activities performed by the occupational health service. It is multidisciplinary and multisectoral activity involving in addition to occupational health and safety professionals other specialists both in the enterprise and outside, as well as competent authorities, the employers, workers and their representatives. Such involvement requires a well-developed and well-coordinated system at the workplace. The necessary infrastructure should comprise all the administrative, organizational and operative systems that are needed to conduct the occupational health practice successfully and ensure its systematic development and continuous improvement.

The most elaborate infrastructure for occupational health practice is described in the ILO Occupational Safety and Health Convention, 1981 (No. 155) and the Occupational Health Services Convention, 1985 (No. 161). The establishment of occupational health services according to the models advocated by the Convention No. 161 and its accompanying Recommendation No. 171 is one of the options. It is however evident that the most advanced occupational health services are in concordance with the ILO instruments. Other types of infrastructures may be used. Occupational medicine, occupational hygiene and occupational safety may be practised separately or together within the same occupational health service. The occupational health service may be a single integrated entity or a composite of different occupational health and safety units unified by a common concern for workers' health and well-being.

Availability of Occupational Health Services

Occupational health services are unevenly distributed in the world (WHO 1995b). In the European Region, about half of the working population remains uncovered by competent occupational health services; the variation among countries is very wide, with coverage figures ranging between 5% and 90% of the workforce. The Central and Eastern European countries now in transition are having problems in providing services due to reorganization of their economic activities and the break-up of the large centralized industries into smaller units.

Lower coverage figures are found on other continents. Only a few countries (United States, Canada, Japan, Australia, Israel) show coverage figures comparable to those in Western Europe. In typical developing regions, the coverage by employee health services ranges from 5% to 10% at best, with services being found mainly in manufacturing enterprises, while some sectors of industry, agriculture, the self-employed, small-scale enterprises and the informal sector are usually not covered at all. Even in countries where coverage rates are high, there are gaps, with small-scale enterprises, certain mobile workers, construction, agriculture and the self-employed being underserved.

Thus, there is a universal need to increase the coverage of workers by occupational health services throughout the world. In a number of countries, intervention programmes to increase the coverage have demonstrated that it is possible to substantially improve the availability of occupational health services in a relatively short time and at a reasonable cost. Such interventions have been found to improve both the workers' access to the services and the cost effectiveness of the services provided.

Policy Impact of International Instruments

The so-called work environment reform which took place in most of the industrialized countries in the 1970s and 1980s saw the production of important international instruments and guidelines. They reflected the responses of occupational health policies to the new needs of working life, and the achievement of an international consensus on the development of occupational safety and health.

The International Programme for the Improvement of Working Conditions and Environment (PIACT) was launched by the ILO in 1976 (Improving Working Conditions and Environment: An International Programme (PIACT) 1984; 71st Session of the International Labour Conference 1985). The ILO Occupational Safety and Health Convention, 1981 (No. 155), with its accompanying Recommendation (No. 164), and the ILO Occupational Health Services Convention, 1985 (No. 161) and its accompanying Recommendation (No. 171), amplified the impact of the ILO in the development of occupational safety and health. By 31 May 1995, 40 ratifications of these Conventions had been registered, but their practical impact was much wider than the number of ratifications, since many countries had implemented the principles embodied in these instruments, although they had not been able to ratify them.

Simultaneously, the WHO Global Strategy Health for All by the Year 2000 (HFA) (1981), first launched in 1979, was followed in the 1980s by introduction and implementation of regional and national HFA strategies in which workers' health constituted an essential part. In 1987, WHO launched a Programme of Action for Workers' Health, and in 1994 the WHO Collaborating Centres in Occupational Health developed the Global Strategy for Occupational Health for All (1995), which was endorsed by the WHO Executive Board (EB97.R6) and unanimously adopted by the World Health Assembly in May 1996 (WHA 49.12).

The most important features of the international consensus on occupational safety and health are:

- a focus on occupational health and safety for all workers irrespective of the sector of the economy, the type of employment (salaried worker or self-employed), the size of the enterprise or company (industry, public sector, services, agriculture and so on)
- the responsibility of governments for the establishment of appropriate infrastructures for occupational health practice through legislation, collective agreements or any other mechanism acceptable to the government after consultation with employers' and workers' representative organizations
- the liability of governments for the development and implementation of occupational safety and health policy in tripartite collaboration with employers' and workers' organizations
- the primary responsibility of the employer for the provision of occupational health services at the enterprise level, who must involve competent occupational health professionals to implement the provisions stipulated by the national legislation or the collective agreements
- the prevention of work accidents and occupational diseases and control of workplace hazards as well as the development of a work environment and work conducive to workers' health are the main purpose of occupational health services.

The United Nations Summit on Environment and Development in Rio de Janeiro in 1993 touched on several aspects of human environment which have relevance to occupational health (WHO 1993). Its Agenda 21 contains elements on providing services for underserved workers and ensuring chemical safety at the workplace. The Rio Declaration emphasized peoples' right to lead "healthy and productive lives in harmony with nature", which would require work and working environment to meet certain minimum health and safety standards.

Such instruments and international programmes directly or indirectly stimulated the inclusion of the provision of occupational health services in the national Health for All by the Year 2000 programmes and other national development programmes. Thus, the international instruments have served as guidelines for the development of national legislation and programmes.

A significant role in the global development of occupational health has been played by the Joint ILO/WHO Committee on Occupational Health, which, in its twelve meetings held since 1950, has made important contributions toward the definition of concepts and their transfer into national and local practices.

Legislative Structures for Occupational Health Practice

Most countries have laws governing the provision of occupational health services, but the structure of the legislation, its content and the workers covered by it vary widely (Rantanen 1990; WHO 1989c). The more traditional laws consider occupational health services as a group of specialized and separate activities such as occupational health care, occupational safety and hygiene services, workplace health promotion programmes and so on. In many countries, instead of stipulating what might be regarded as programmes, the legislation stipulates the responsibility of employers to provide health risk assessments, health examinations of workers or other individual activities related to workers' health and safety.

More recent laws reflecting international guidelines such as those contained in the ILO Convention on Occupational Health Services (No. 161) consider the occupational health service as an integrated, comprehensive, multidisciplinary team containing all the elements needed for the improvement of health at work, improvement of the working environment, promotion of workers' health, and the overall development of the structural and managerial aspects of the workplace needed for health and safety.

The legislation usually delegates the authority to establish, implement and inspect occupational health services to such ministries or agencies as Labour, Health or Social Security (WHO 1990).

There are two main types of legislation regulating occupational health services:

One views the occupational health service as an integrated multidisciplinary service infrastructure and stipulates the objectives, activities, obligations and rights of the various partners, the conditions of operation, as well as the qualifications of its personnel. Examples include the European Union Framework Directive No. 89/391/EEC on Occupational Safety and Health (CEC 1989; Neal and Wright 1992), the Dutch ARBO Act (Kroon and Overeynder 1991) and the Finnish Act on Occupational Health Services (Translation of the Occupational Health Care Act and the Council of the State Decree No. 1009 1979). There are only a few examples of the organization of systems of occupational health services in the industrialized world that are in accord with this type of legislation, but their number is expected to grow with progressive implementation of the European Union Framework Directive (89/391/EEC).

The other type of legislation is found in most industrialized countries and is more fragmented. Instead of a single act stipulating the occupational health service as an entity, it involves a number of laws that simply oblige employers to carry out certain activities. These may be stipulated quite specifically or merely in general, leaving issues of their organization and conditions of operation open (WHO 1989c). In many developing countries, this legislation is applicable only to main industrial sectors, while large numbers of other sectors as well as agriculture, small-scale enterprises and the informal sector remain uncovered.

During the 1980s, particularly in industrialized countries, social and demographic developments such as ageing of the working population, increase in disability pensions and sickness absenteeism, and difficulty in controlling social security budgets led to some interesting reforms of national occupational health systems. These focused on the prevention of both short-term and long-term disability, preservation of working capacity, particularly of older workers, and reducing early retirement.

For example, the amendment of the Dutch ARBO Act (Kroon and Overeynder 1991) together with three other social laws aimed at the prevention of short- and long-term disability stipulated important new requirements for occupational health and safety services at the plant level. They included:

- minimum requirements for procedures, guidelines and facilities
- minimum requirements for the numbers, composition and competence of occupational health service teams, including such specialists as physicians with competence in occupational health, senior safety experts, occupational hygienists and management consultants
- requirements specifying the organization of services and their activities
- requirement of quality assurance systems, including appropriate audits
- requirement that the specialists working in the service be certified by appropriate authorities and that the service itself be certified on the basis of an external audit.

This new system will be implemented stepwise and should be mature before the end of the 1990s.

Amendments of the Finnish Act on Occupational Health Services in 1991 and 1994 introduced the maintenance of working capacity, particularly of ageing workers, as a new element in the legislation-based preventive activities of occupational health services. Implemented through the close collaboration of all the actors in the workplace (management, workers, health and safety services), it involves improvement and adaptation of work, working environment and equipment to the worker, improving and maintaining the physical and mental working capacity of the worker, and making the work organization more conducive to maintaining the work capacity of the worker. Currently, efforts are being directed at the development and evaluation of practical methods to achieve these goals.

The adoption in 1987 of the Single European Act gave new impetus to the occupational health and safety measures taken by the European Communities. This was the first time health and safety at work had been directly included in the EEC Treaty of 1957 and was done through the new Article 118a. Of significant importance to the level of protection is that directives adopted by the Member States under Article 118a lay down minimum requirements concerning health and safety at work. According to this principle, the Member States must raise their level of protection if it is lower than the minimum

requirements set by the directives. Beyond this, they are entitled and encouraged to maintain and introduce more stringent protective measures than required by the directives.

June 1989 saw the adoption of the first and probably the most important Directive providing for minimum requirements concerning health and safety at work under Article 118a: Framework Directive 89/391/EEC on the introduction of measures to encourage improvements in the safety and health of workers at work. It is the core strategy on health and safety on which all subsequent directives will be built. The Framework Directive is to be supplemented by individual directives covering specific areas and also sets the general framework for future directives related to it.

The Framework Directive 89/391/EEC contains many features of the ILO Conventions Nos. 155 and 161 which the 15 countries of the European Union will implement in their national laws and practices. Main provisions that are relevant to occupational health practice include:

- the development of a coherent overall prevention policy at the enterprise level covering the working environment, technology, organization of work, working conditions and social relationships
- the responsibility of the employer to ensure the safety and health of workers in every aspect related to the work, including prevention of occupational hazards, provision of information and training, as well as provision of the necessary work organization, control measures and means that occupational health activities should be carried out in collaboration between employers and workers
- that workers should receive health surveillance adequate for the health risks they incur at work
- that workers have the right to receive all the necessary information concerning the safety and health risks as well as preventive and protective measures in respect of both the enterprise in general and each type of workstation and work practice
- that the planning and introduction of new technologies should be subject to consultation with the workers and/or their representatives, as regards the choice of equipment, working conditions and the working environment for the safety and health of workers
- that the general principles of prevention should include the elimination of occupational hazards; evaluation of hazards which cannot be avoided; combating the risks at the source; adapting the work to the individual, especially as regards the design of workplaces, the choice of equipment and working and production methods; adapting to technical progress; replacing dangerous substances by non-dangerous or less dangerous ones; giving collective protective measures priority over individual protective measures; giving appropriate instructions to the workers.

During the past years, a large amount of European Union legislation has been introduced, including a series of individual directives based on the principles formulated in the Framework Directive, some supplementing those which had been subject to technical harmonization measures in preparation, and others covering specific risks and high-risk sectors. Examples of the first group are directives concerning the minimum safety and health requirements for the workplace, for the use of work equipment by workers at work, for the use of personal protective equipment, for the manual handling of loads, for work with display screen equipment, for the provision of safety and health signs at work, and the implementation of the minimum safety and health requirements at temporary or mobile construction sites. The second group includes such directives as the protection of workers from the risks related to exposure to vinyl chloride monomer, metallic lead and its ionic compounds, asbestos at work, carcinogens at work, biological agents at work, the protection of workers by the banning of certain specified agents and/or certain work activities, and some others (Neal and Wright 1992; EC 1994).

Proposals have been made recently for the adoption of other directives (namely, the directives on physical agents, chemical agents, transport activities and workplaces, and work equipment) in order to consolidate some existing directives and rationalize the overall approach to the safety and health of workers in these fields (EC 1994).

Many new elements in the national legislation and practices respond to today's emerging problems of working life and contain provisions for further development of occupational health infrastructures. This especially concerns programming, at the national and enterprise level, more comprehensive activities in respect of psychosocial, organizational and work capacity aspects and particular emphasis on the principle of participation. They also provide for the application of quality management systems, auditing and certification of both the competence of the experts and services to meet the requirements of occupational safety and health legislation. Thus, such national laws, by absorbing the substantive content of the ILO instruments, no matter whether the instruments are ratified or not, lead to the stepwise implementation of the objectives and principles embodied in the ILO Conventions Nos. 155 and 161 and in the WHO HFA Strategy.

Objectives of Occupational Health Practice

The objectives of occupational health practice that were originally defined in 1950 by the Joint ILO/WHO Committee on Occupational Health stated that:

Occupational health should aim at the promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations; the prevention amongst workers of departures from health caused by their working conditions; the protection of workers in their employment from risks resulting from factors adverse to health; the placing and maintenance of the worker in an occupational environment adapted to his physiological and psychological capabilities; and, to summarize: the adaptation of work to man and of each man to his job.

In 1959, based on discussions of the special ILO tripartite committee (representing governments, employers and workers), the Forty-third Session of the International Labour Conference adopted Recommendation No. 112 (ILO 1959) which defined an occupational health service as a service established in or near a place of employment for the purposes of:

- protecting the workers against any health hazard which may arise out of their work or the conditions in which it is carried on
- contributing towards the workers' physical and mental adjustment, in particular by the adaptation of the work to the workers and their assignment to jobs for which they are suited
- contributing to the establishment and maintenance of the highest possible degree of physical and mental well-being of the workers.

In 1985, the ILO adopted new international instruments-the Occupational Health Services Convention (No. 161) and its accompanying Recommendation (No. 171) (ILO 1985a, 1985b)- which defined occupational health services as services entrusted with essentially preventive functions and responsible for advising the employer, the workers and their representatives in the undertaking on: the requirements for establishing and maintaining a safe and healthy working environment which will facilitate optimal physical and mental health in relation to work; and the adaptation of work to the capabilities of workers in light of their state of physical and mental health.

In 1980, the WHO/Euro Working Group on Evaluation of Occupational Health and Industrial Hygiene Services (WHO 1982) defined the ultimate goal of such services as "promoting conditions at work that guarantee the highest degree of quality of working life by protecting workers' health, enhancing their physical, mental and social well-being, and preventing ill-health and accidents".

The extensive survey of occupational health services in the 32 countries in the European Region carried out in 1985 by the WHO Regional Office for Europe (Rantanen 1990) identified the following principles as objectives of occupational health practice:

- protecting workers' health against hazards at work (the protection and prevention principle)
- adapting work and the work environment to the capabilities of workers (the adaptation principle)
- enhancing the physical, mental and social well-being of workers (the health promotion principle)
- minimizing the consequences of occupational hazards, accidents and injuries, and occupational and work-related diseases (the cure and rehabilitation principle)
- providing general health care services for workers and their families, both curative and preventive, at the workplace or from nearby facilities (the general primary health care principle).

Such principles can still be considered to be relevant with respect to the new developments in countries' policies and legislation. On the other hand, the formulation of objectives of occupational health practice as they stand on recent national laws and the development of new needs for working life seem to emphasize the following trends (WHO 1995a, 1995b; Rantanen, Lehtinen and Mikheev 1994):

- The scope of occupational health is expanding to cover not only health and safety but also psychological and social well-being and the ability to conduct socially and economically productive life.
- The full range of objectives extends beyond the scope of traditional occupational health and safety issues.
- The new principles go beyond the mere prevention and control of effects adverse to the health and safety of workers to the positive promotion of health, the improvement of the working environment and work organization.

Thus, there certainly exists a tendency for expansion of the scope of the objectives of occupational health practice towards new types of issues entailing social and economic consequences for workers.

Functions and Activities of Occupational Health Services

To protect and promote the health of workers, an occupational health service has to meet the special needs of the enterprise it serves and the workers employed in it. With the enormous range and scope of industrial, manufacturing, commercial, agricultural and other economic activities, it is not possible to lay down a detailed programme of activity or pattern of organization and conditions of operation for an occupational health service which should be suitable for all enterprises and in all circumstances. According to the ILO Occupational Safety and Health Convention (No. 155) and the ILO Occupational

Health Services Convention (No. 161), the prime responsibility for health and safety of workers rests with the employers. The functions of an occupational health service are to protect and promote the health of workers, improve working conditions and the working environment and maintain the health of the enterprise as a whole by providing occupational health services to workers and expert advice to the employer on how to achieve the highest possible standards of health and safety in the interests of the particular working community of which it is a part.

ILO Convention No. 161 and its accompanying Recommendation No. 171 envisage occupational health services as multidisciplinary, comprehensive and, although essentially preventive, also allow for carrying out curative activities. The WHO documents calling for services for small-scale enterprises, the self-employed and agricultural workers encourage the provision of services by primary health care units (Rantanen, Lehtinen and Mikheev 1994). The documents described above and national laws and programmes recommend a stepwise implementation so that the occupational health activities can be adjusted to the national and local needs and the prevailing circumstances.

Ideally, an occupational health service should establish and act in accordance with a programme of activities adapted to the needs of the enterprise where it operates. Its functions should be adequate and appropriate to the occupational hazards and health risks of the enterprise it serves, with particular attention given to the problems specific to the branch of economic activity concerned. The following represent the basic functions and most typical activities of an occupational health service.

Preliminary orientation to the enterprise

If occupational health services have not been previously provided or when new occupational health service staff members are recruited, a preliminary orientation to the occupational safety and health situation of the enterprise is needed. This involves the following steps:

- Analysis of the type of production will indicate the types of hazards typical for the economic activity, work or occupation which therefore may be expected to be encountered in the enterprise and can help identify those that may call for special attention.
- Review of problems that have been identified by occupational health professionals, management, workers or other specialists, and occupational health measures that have previously been undertaken at the workplace will indicate the perception of the problems by the enterprise. This should include examination of reports of occupational health and safety activities, industrial hygiene measurements, biological monitoring data and so on.
- Review of the characteristics of the workforce (i.e., numbers by age, sex, ethnic background, family relations, occupational classifications, work history and, if available, related health issues) will help to identify vulnerable groups and those with special needs.
- Available data on occupational diseases and accidents and sickness absenteeism grouped, if possible, by department, occupation and type of work, causative factors and the type of injury or disease should be examined.
- Data on working methods, chemical substances handled at work, recent exposure measurements and the numbers of workers exposed to special hazards are needed for the identification of the priority problems.
- The knowledge by employees of occupational health problems, the extent of their training in emergency measures and first-aid, and the prospects for an effective occupational safety and health committee should be explored.
- Finally, pending plans for changes in production systems, installation of new facilities, machinery and equipment, introduction of new materials and changes in the organization of work should be examined as a basis for changing the occupational health practice in the future.

Surveillance of the working environment

The quality of the working environment through compliance with safety and health standards has to be ensured by surveillance at the workplace. According to ILO Convention No. 161, surveillance of the working environment is one of the main tasks of the occupational health services.

On the basis of the information obtained through the preliminary orientation to the enterprise, a walk-through survey of the workplace is conducted, preferably by a multidisciplinary occupational health team supplemented by employers' and workers' representatives. This should include interviews with managers, foremen and workers. When needed, special safety, hygiene, ergonomic or psychological checks can be performed.

Special checklists and guidelines are available and are recommended for such surveys. The observations may indicate a need for specific measurements or checks which should be performed by specialists in occupational hygiene, ergonomics, toxicology, safety engineering or psychology who may be members of the occupational health team of the enterprise or may have to be procured externally. Such special measurements or checks may be beyond the resources of small-scale enterprises, which

would have to rely on observations made during the survey supplemented by qualitative or, in the best case, by semi-quantitative data as well.

As a basic checklist for the identification of potential health hazards, the List of Occupational Diseases (amended 1980) appended to the ILO Employment Injury Benefits Convention, 1964 (No. 121), may be recommended. It lists the major known causes of occupational diseases, and although its main purpose is to provide guidance for compensation of occupational diseases, it can also serve for their prevention. Hazards not mentioned in the list can be added according to national or local conditions.

The scope of surveillance of the working environment as defined by the ILO Occupational Health Services Recommendation (No. 171) is as follows:

- identification and evaluation of the environmental factors which may affect the workers' health
- assessment of conditions of occupational hygiene and factors in the organization of work which may give rise to risks for the health of workers
- assessment of collective and personal protective equipment
- assessment where appropriate, by valid and generally accepted monitoring methods, of exposure of workers to hazardous agents
- assessment of control systems designed to eliminate or reduce exposure.

As a result of the walk-through survey a hazard inventory should be prepared, identifying each hazard inherent in the enterprise. This inventory is necessary for estimating a potential for exposure and suggesting control measures. For purposes of this inventory and to facilitate designing, implementing and evaluating of controls, hazards should be cross-classified by the risks they present for workers' health with acute or chronic outcomes and by type of hazard (i.e., chemical, physical, biological, psychological or ergonomic).

The next step is a quantitative assessment of exposure, which is necessary for more exact health hazard evaluation. It consists of measuring the intensity or concentration, the variation in time, the total duration of exposure, as well as the number of workers exposed. Measurement and evaluation of exposure are usually conducted by occupational hygienists, ergonomists and specialists in injury control. They are based on the principles of environmental monitoring and should include, where necessary, ambient monitoring to collect data on exposure in a given working environment, and personal exposure monitoring of an individual worker or a group of workers (e.g., exposed to specific hazards). Measurement of exposure is necessary whenever hazards are suspected or reasonably predictable, and should be based on the completed hazard inventory combined with an assessment of work practices. Knowledge of potential effects caused by each hazard should be used to establish priorities for intervention.

The evaluation of health hazards in the workplace should be accomplished by considering the complete picture of exposures in comparison with established occupational exposure standards. Such standards are expressed in terms of permissible levels and exposure limits and are set up through numerous scientific studies correlating exposure with produced health effects. Some of them have become state standards and are legally enforceable according to national law and practice. Examples are Maximum Allowable Concentrations (MAKs in Germany, MACs in the East European countries) and Permissible Exposure Limits (PELs, United States). There are PELs for about 600 chemical substances commonly found in the workplace. There are also limits on time-weighted average exposure, short-term exposure limits (STELs), ceilings, and for some hard conditions that might result in skin absorption.

Surveillance in the working environment includes monitoring both the hazardous exposures and the health outcomes. If exposure to hazards is excessive, it should be controlled regardless of outcome, and the health of exposed workers should be evaluated. Exposure is considered excessive if it approaches or exceeds established limits such as those mentioned above.

Surveillance of the work environment provides information on the occupational health needs of the enterprise and indicates the priorities for preventive and control actions. Most of the instruments guiding occupational health services emphasize the need to carry out the surveillance before initiating services, periodically during the course of the activities, and always when substantial changes in work or the working environment have taken place.

The results obtained provide the necessary data to estimate whether preventive actions taken against health hazards are effective, as well as whether workers are placed in jobs adequate to their capacities. These data are also used by the occupational health service to ensure that reliable protection against exposures is maintained and to formulate advice on how to implement controls in order to improve the working environment. In addition, the accumulated information is used for epidemiological surveys, for the revision of permissible exposure levels, as well as for the evaluation of the effectiveness of the engineering control measures and other methods of various preventive programmes.

Informing employer, enterprise management and workers about occupational health hazards

As information about potential workplace health hazards is obtained, it should be communicated to those responsible for implementing preventive and control measures as well as to the workers exposed to these hazards. The information should be as precise and quantitative as possible, describing the preventive measures being taken and explaining what the workers should do to ensure their effectiveness.

The ILO Occupational Health Services Recommendation, 1985 (No. 171) provides that in accordance with national law and practice, data resulting from surveillance of the working environment should be recorded in an appropriate manner and be available to the employer, the workers and their representatives, or to the safety and health committee, where one exists. These data should be used on a confidential basis solely to provide guidance and advice on measures to improve the working environment and the safety and health of workers. The competent authority should also have access to these data. They may be communicated to others by the occupational health service only with the agreement of the employer and the workers. Workers concerned should be informed in an adequate and appropriate manner of the results of the surveillance and should have the right to request the monitoring of the working environment.

Assessment of health risks

To assess occupational health risks, information from surveillance of the work environment is combined with information from other sources, such as epidemiological research on particular occupations and exposures, reference values like occupational exposure limits and available statistics. Qualitative (e.g., whether the substance is carcinogenic) and, where possible, quantitative (e.g., what is the degree of exposure) data may demonstrate that workers face health hazards and indicate a need for preventive and control measures.

The steps in an occupational health risk assessment include:

- identification of occupational health hazards (performed as a result of surveillance of the working environment)
- analysis of how the hazard may affect the worker (ways of entry and type of exposure, threshold limit values, dose-response relationships, adverse health effects it may cause and so on)
- identification of workers or group of workers exposed to specific hazards
- identification of individuals and groups with special vulnerabilities
- evaluation of available hazard prevention and control measures
- making conclusions and documenting the findings of the assessment
- periodic review and, if necessary, reassessment.

Surveillance of workers' health

Due to limitations of a technological and economic nature, it is often not possible to eliminate all health hazards in the workplace. It is in these circumstances that surveillance of workers' health plays a major role. It comprises many forms of medical evaluation of health effects developed as a result of workers' exposure to occupational health hazards.

The main purposes of health examinations are to assess the fitness of a worker to carry out certain jobs, to assess any health impairment which may be related to the exposure to harmful agents inherent in the work process and to identify cases of occupational diseases in accordance with national legislation.

Health examinations cannot protect workers against health hazards and they cannot substitute for appropriate control measures, which have the first priority in the hierarchy of actions. Health examinations help to identify conditions which may make a worker more susceptible to the effects of hazardous agents or detect early signs of health impairment caused by these agents. They should be conducted in parallel with surveillance of the working environment, which provides information on potential exposure in the workplace and is used by occupational health professionals to assess results obtained through health surveillance of the exposed workers.

Health surveillance of workers may be passive and active

In case of passive health surveillance, ill or affected workers are required to consult occupational health professionals. Passive surveillance usually detects only symptomatic disease and requires that occupational health professionals be able to differentiate the effects of occupational exposures from the similar effects of non-occupational exposures.

In case of active health surveillance, occupational health professionals select and examine workers who are at high risk of work-related disease or injury. It may be conducted under many forms, including periodic medical examinations for all workers, medical examinations for workers exposed to specific health hazards, screening and biological monitoring of selected groups of workers. Specific forms of

health surveillance depend largely upon possible health effects resulting from a particular occupational exposure. Active surveillance is more appropriate for workers with a history of multiple exposures and those at higher risk for disease or injury.

Details about health surveillance are given in the ILO Convention No. 161 and Recommendation No. 171. These instruments specify that surveillance of workers' health should include, in the cases and under the conditions specified by the competent authority, all assessments necessary to protect the health of workers, which may include:

- health assessment of workers before their assignment to specific tasks which may involve a danger to their health or that of others
- health assessment at periodic intervals during employment which involves exposure to a particular hazard to health
- health assessment on resumption of work after a prolonged absence for health reasons, for the purposes of determining possible occupational causes, recommending appropriate action to protect the workers and determining the workers' suitability for the job and needs for assignment and rehabilitation
- health assessment on and after termination of assignment involving hazards which might cause or contribute to future health impairment.

Evaluation of the health status of workers is of utmost importance when occupational health practice is initiated, when new workers are recruited, when new working practices are adopted, when new technologies are introduced, when special exposures are identified, and when individual workers display health characteristics that need follow-up. A number of countries have special regulations or guidelines specifying when and how health examinations should be carried out. Health examinations should be monitored and continuously developed to identify the work-related health effects at their earliest stage of development.

Pre-assignment (pre-employment) health examinations

This type of health assessment is carried out before the job placement of workers or their assignment to specific tasks which may involve a danger to their health or that of others. The purpose of this health assessment is to determine whether a person is physically and psychologically fit to perform a particular job and to ensure that his or her placement in this job will not represent a danger to his or her health or to the health of other workers. In most instances, a review of the medical history, a general physical examination and routine laboratory tests (e.g., simple blood count and urinalysis) will suffice, but in some cases the presence of a health problem or the unusual requirements of a particular job will require extensive functional examinations or diagnostic testing.

There are a number of health problems that may make a certain job hazardous for the worker or incur a risk for the public or other workers. For these reasons, it may be necessary, for example, to exclude workers with uncontrolled hypertension or unstable diabetes from certain hazardous jobs (e.g., air and sea pilots, drivers of public service and heavy goods vehicles, crane drivers). Colour blindness may justify an exclusion from jobs requiring colour discrimination for safety purpose (e.g., reading traffic signals). In jobs demanding a high standard of general fitness like deep-water diving, fire fighting, police service and aircraft piloting, only workers able to meet the performance requirements would be acceptable. A possibility that chronic diseases may be aggravated by the exposures involved in a particular job should also be considered. It is essential, therefore, that the examiner have a detailed knowledge of the job and the work environment and be aware that standardized job descriptions may be too superficial or even misleading.

After finishing a prescribed health assessment, the occupational physician should communicate the results in writing to both the worker and the employer. These conclusions communicated to the employer should contain no information of a medical nature. They should contain a conclusion about the fitness of the examined person for the proposed or held assignment and specify the kinds of jobs and the conditions of work which are medically contra-indicated either temporarily or permanently.

The pre-employment medical examination is important to the worker's subsequent occupational history since it provides the necessary clinical information and laboratory data on the worker's health status at the moment of entering the employment. It also represents an indispensable baseline for the subsequent evaluation of any changes in health status that may occur later on.

Periodic health examinations

These are performed at periodic intervals during employment which involves exposure to potential hazards that could not be entirely eliminated by preventive and control measures. The purpose of periodic health examinations is to monitor the health of workers during the course of their employment. It aims at verifying workers' fitness in relation to their jobs and at detecting as early as possible any sign of ill-health which may be due to work. They are often supplemented by other examinations in accordance with the nature of hazards observed.

Their objectives include:

- identifying as early as possible any adverse health effects caused by work practices or exposures to potential hazards
- detecting the possible onset of an occupational disease
- verifying whether the health of an especially vulnerable or chronically ill worker is being adversely affected by the work or the work environment
- monitoring personal exposure with the help of biological monitoring
- checking the effectiveness of preventive and control measures
- identifying possible health effects of changes in the working practices, technology or substances used in the enterprise.

These objectives will determine the frequency, content and methods of the periodic health examinations, which may be conducted as frequently as every one to three months or every few years, depending on the nature of the exposure, the biological response expected, the opportunities for preventive measures and the feasibility of the examination method. They may be comprehensive or limited to just a few tests or determinations. Special guidelines on the purpose, frequency, content and methodology of these examinations are available in a number of countries.

Return-to-work health examinations

This type of health assessment is required to authorize the resumption of work after a long absence for health reasons. This health examination determines the workers' suitability for the job, recommends appropriate actions to protect them against future exposures, and identifies whether there is a need for a reassignment or a special rehabilitation.

Similarly, when a worker changes jobs, the occupational physician is required to certify that the worker is fit to carry out the new duties. The objective of the examination, the need and the use of the results determine its content and methods and the context in which it is performed.

General health examinations

In many enterprises, general health examinations may be performed by the occupational health service. They are usually voluntary and may be available to the entire workforce or only to certain groups determined by age, length of employment, status in the organization and so on. They may be comprehensive or limited to screenings for particular diseases or health risks. Their objectives determine their frequency, contents and methods used.

Health examinations after the ending of service

This type of health assessment is performed after the termination of assignment involving hazards which could cause or contribute to future health impairment. The purpose of this health assessment is to make a final evaluation of workers' health, compare it with previous medical examinations and to assess how the prior job assignments may have affected their health.

General observations

The general observations summarized below apply to all types of health examinations.

Health examinations of workers should be conducted by professionally qualified personnel trained in occupational health. These health professionals should be familiar with the exposures at work, physical requirements and other conditions of work in the enterprise and experienced in using appropriate medical examination techniques and instruments, as well as in keeping correct record forms.

The health examination is not a substitute for action to prevent or control hazardous exposures in the working environment. If prevention has been successful, fewer examinations are needed.

All data collected in connection with health examinations are confidential and should be recorded by the occupational health service in a personal confidential health files. Personal data relating to health assessments may be communicated to others only with the informed consent of the worker concerned. When the worker wishes the data to be forwarded to a personal physician, he or she provides formal permission for this.

Conclusions about the suitability of a worker for a particular job or about the health effects of the job should be communicated to the employer in a form that does not violate the principle of the confidentiality of personal health data.

Use of health examinations and their results for any kind of discrimination against workers cannot be tolerated and must be strictly prohibited.

Initiatives for preventive and control measures

Occupational health services are responsible not only for the identification and evaluation of potential risks for the health of workers but also for providing advice on preventive and control measures which will help to avoid risks.

After analysing the results of surveillance of the working environment, including where necessary workers' personal exposure monitoring, and the results of workers' health surveillance, including where necessary the results of biological monitoring, occupational health services should be in a position to assess possible connections between the exposure to occupational hazards and resulting health impairments and to propose appropriate control measures to protect workers' health. These measures are recommended together with other technical services in the enterprise after consulting the enterprise management, employers, workers or their representatives.

Control measures should be adequate to prevent unnecessary exposure during normal operating conditions as well as during accident and emergencies. Planned modifications in work processes should also be taken into account, and recommendations should be adaptable to future needs.

Measures of control of health hazards are used to eliminate occupational exposure, minimize or in any case reduce it to permissible limits. They include primarily engineering, engineering controls in the work environment, changes in technology, substances and materials and as secondary preventive measures, human behaviour controls, personal protective equipment, integrated control and others.

The formulation of recommendations for control measures is a complicated process that includes the analysis of information on existing health risks in the enterprise and the consideration of occupational safety and health requirements and needs. For analysis of feasibility and costs versus benefits one should consider the fact that the investments made for health and safety may pay back during long periods in the future, but not necessarily immediately.

The ILO instruments include a requirement that the employers, workers and their representatives should cooperate and participate in the implementation of such recommendations. They are usually discussed by the safety and health committee at large-scale enterprises, or in smaller enterprises by the representatives of the employers and workers. It is important to document the proposed recommendations so that there can be a follow-up of their implementation. Such documentation should emphasize the responsibility of management for preventive and control actions at the enterprise.

Advisory role

Occupational health services have an important task to perform by providing advice to the enterprise management, the employers, the workers, and health and safety committees in their collective as well as individual capacities. This needs to be recognized and used in the decision-making processes as it often happens that occupational health professionals are not directly involved in the decision-making.

The ILO Occupational Health Services Convention (No. 161) and Recommendation (No. 171) promote the advisory role of occupational health professionals in the enterprise. To promote the adaptation of work to the workers and improve working conditions and environment, occupational health services should act as advisers on occupational health, hygiene, ergonomics, collective and individual protective equipment to the employers, the workers and their representatives in the enterprise, and to the safety and health committee, and should collaborate with other services already operating as advisers in these fields. They should advise on the planning and organization of work, the design of workplaces, on the choice, maintenance and condition of machinery and other equipment, as well as on the substances and materials used in the enterprise. They should also participate in the development of programmes for the improvement of working practices, as well as in the testing and evaluation of health aspects of new equipment.

Occupational health services should provide workers with personal advice concerning their health in relation to work.

Another important task is to provide advice and information related to the integration of workers who have been victims of work accidents or diseases in order to help them in their rapid rehabilitation, protect their working capacity, reduce absenteeism and restore a good psychosocial climate in the enterprise.

Educational and training activities are closely linked to the advisory task that occupational health professionals perform vis-a-vis the employers and workers. They are of particular importance when the modification of existing installations or the introduction of new equipment are envisaged, or when there may be changes in the layout of workplaces, workstations and in the organization of work. Such activities have an advantage when started at the right time because they provide for better consideration of human factors and ergonomic principles in the improvement of working conditions and environment.

Technical advisory services at the workplace constitute an important preventive function of occupational health services. They should give priority to the awareness of occupational hazards and to the involvement of the employers and workers in hazard control and the improvement of the working environment.

First aid services and emergency preparedness

The organization of first aid and emergency treatment is a traditional responsibility of occupational health services. ILO Convention No. 161 and Recommendation No. 171 stipulate that the occupational health service should provide first aid and emergency treatment in cases of accident or indisposition of workers at the workplace and should collaborate in the organization of first aid.

This covers preparedness for accidents and acute health conditions in individual workers, as well as readiness for response in collaboration with other emergency services in cases of serious accidents affecting the entire enterprise. Training in first aid is a primary duty of occupational health services, and the personnel of these services are among the first to respond.

The occupational health service should make appropriate preliminary arrangements for ambulance services and with community fire, police and rescue units and local hospitals in order to avoid delays and confusion that may threaten the survival of critically injured or affected workers. These arrangements, supplemented by drills when feasible, are particularly important in preparing for major emergencies such as fire, explosions, toxic emissions and other catastrophes that may involve many individuals in the enterprise as well as in the neighbourhood and may result in a number of casualties.

Occupational health care, general preventive and curative health services

Occupational health services may be involved in the diagnosis, treatment and rehabilitation of occupational injuries and diseases. The knowledge of occupational diseases and injuries coupled with the knowledge of the job, the working environment and occupational exposures present in the workplace enable the occupational health professionals to play a key role in the management of work-related health problems.

According to the scope of activities and as required by national legislation or based on national practice, occupational health services fall into three main categories:

- occupational health services with essentially preventive functions, including mainly workplace visits, health examinations and the provision of first-aid
- occupational health services with preventive functions supplemented by selective curative and general health care services
- occupational health services with a wide range of activities including both preventive and comprehensive curative and rehabilitation activities.

The ILO Occupational Health Services Recommendation (No. 171) promotes the provision of curative and general health care services as functions of occupational health services where they are found to be appropriate. Based on national legislation and practice, the occupational health service may undertake or participate in one or more of the following curative activities with regard to occupational illnesses:

- treatment of workers who have not stopped work or who have resumed work after an absence
- treatment of workers with occupational diseases or health impairments aggravated by work
- treatment of victims of occupational accidents and injuries
- medical aspects of vocational re-education and rehabilitation.

The provision of general preventive and curative health care services includes the prevention and treatment of non-occupational illnesses and other relevant primary health care services. Usually, general preventive health care services include immunizations, maternity and child care, general hygiene and sanitary services, whereas general curative health care services include conventional general-practitioner-level practice. Here, ILO Recommendation No. 171 prescribes that the occupational health service may, taking into account the organization of preventive medicine at the national level, fulfil the following functions:

- carry out immunizations in respect of biological hazards in the working environment
- take part in campaigns aimed at the protection of workers' health
- collaborate with the health authorities within the framework of public health programmes.

Occupational health services set up by large enterprises, as well as those operating in remote or medically underserved areas, may be called upon to provide general non-occupational health care not only for workers but for their families as well. The extension of such services depends on the

infrastructure of the health services in the community and on the capacity of the enterprises. When industrial enterprises are established in poorly developed areas, it may even be expedient to provide such services together with occupational health care.

In some countries, occupational health services provide ambulatory treatment during working hours which is normally provided by a general practitioner. It usually concerns simple forms of treatment, or it may be more comprehensive medical care if the enterprise has an agreement with the social security or other insurance institutions providing reimbursement of the cost of workers' treatment.

Rehabilitation

The participation of occupational health services is particularly crucial in guiding workers' rehabilitation and their return to work. This is becoming more and more important owing to a large number of occupational accidents in developing countries and the ageing of the working populations in industrialized societies. Rehabilitation services are usually provided by external units which may be free-standing or hospital-based and staffed by rehabilitation specialists, occupational therapists, vocational counsellors and so on.

There are some important aspects concerning the participation of occupational health services in the rehabilitation of injured workers.

First, the occupational health service may play an important role in seeing that workers recovering from injury or disease are referred to them promptly. It is greatly preferable, when practicable, for a worker to return to his or her original place of employment, and it is an important function of the occupational health service to maintain contact during the period of incapacity with those responsible for treatment during the acute stages in order to identify the time when a return to work can be envisaged.

Second, the occupational health service can facilitate an early return to work by collaborating with the rehabilitation unit in planning. Its knowledge of the job and work environment will be helpful in exploring the possibilities of modifying the original job (e.g., changes in work assignment, limited hours, rest periods, special equipment and so on) or arranging an alternative temporary substitute.

Finally, by following the worker's progress, the occupational health service can keep management informed of the probable duration of absence or limited capacity, or the extent of any residual disability, so that arrangements for alternative staffing may be made with minimal impact on production schedules. On the other hand, the occupational health service maintains a link with the workers and often with their families, facilitating and better preparing their return to work.

Adaptation of work to the workers

To facilitate the adaptation of work to the workers and improve the working conditions and environment, occupational health services should advise the employer, the workers and the safety and health committee in the enterprise on matters of occupational health, occupational hygiene and ergonomics. Recommendations may include modifications of the job, the equipment and the working environment that will allow the worker to perform effectively and safely. This may involve reducing the physical workload for an ageing worker, providing special equipment for workers with sensory or locomotor impairments or fitting equipment or work practices to the anthropometric dimensions of the worker. The adaptations may be required temporarily in the case of workers recovering from an injury or disease. A number of countries have legal provisions requiring workplace adaptations.

Protection of vulnerable groups

The occupational health service is responsible for recommendations that will protect vulnerable groups of workers, such as those with hypersensitivities or chronic diseases and those with certain disabilities. This may include selection of a job that minimizes adverse effects, provision of special equipment or protective devices, prescription of sick leave and so on. The recommendations must be feasible in the light of the circumstances in a particular workplace, and workers may be required to undertake special training in appropriate working practices and the use of personal protective equipment.

Information, education and training

Occupational health services should play an active role in providing relevant information and organizing education and training in relation to work.

The ILO Occupational Health Services Convention (No. 161) and Recommendation (No. 171) provide for the participation of occupational health services in designing and implementing programmes of information, education and training in the field of occupational safety and health for the personnel of the enterprise. They should participate in the progressive and continuing training of all workers in the enterprise who contribute to occupational safety and health.

Occupational health professionals can help increase workers' awareness of occupational hazards to which they are exposed, discuss with them existing health risks and advise workers on the protection of their health, including protective measures and proper use of personal protective equipment. Every contact with workers offers an opportunity to provide useful information and to encourage healthful behaviour in the workplace.

Occupational health services should provide all information on occupational hazards present in the enterprise as well as on safety and health standards relevant to the local situation. This information should be written in language understandable by the workers. It should be provided on a periodic basis and especially when new substances or equipment are being introduced or changes are being made in the working environment.

Education and training can play a key role in the improvement of working conditions and environment. Efforts to improve safety, health and welfare at work are often substantially limited due to lack of awareness, technical expertise and know-how. Education and training in specific fields of occupational safety and health and working conditions can facilitate both the diagnosis of problems and the implementation of solutions, and can therefore help overcome these limitations.

ILO Conventions Nos. 155 and 161 and their accompanying Recommendations emphasize the key role of education and training in the enterprise. Training is essential to fulfil the obligations of both the employers and the workers. Employers are responsible for the organization of in-plant occupational safety and health training, and workers and their representatives in the enterprise should fully cooperate with them in this respect.

Training in occupational safety and health should be organized as an integral part of the overall efforts for improving working conditions and environment, and occupational health services should play a major role in this respect. It should aim at solving various problems affecting the physical and mental well-being of workers and should address adaptation to technology and equipment, improvement of working environment, ergonomics, working time arrangements, the organization of work, job content and workers' welfare.

Health promotion activities

There is some tendency, particularly in North America, to incorporate wellness promotion activities in the form of occupational health programmes. These programmes are, however, essentially general health promotion programmes that may include such elements as health education, stress management and assessment of health risks. They usually aim at changing personal health practices such as alcohol and drug abuse, smoking, diet and physical exercise, with a view to improving overall health status and reducing absenteeism. Although such programmes are supposed to improve productivity and reduce health care costs, they have not been properly evaluated so far. These programmes, designed as health promotion programmes, though valuable as such are not usually considered as occupational health programmes, but as public health services delivered in the workplace, because they focus attention and resources on personal health habits rather than on protection of workers against occupational hazards.

It should be recognized that the implementation of health promotion programmes is an important factor contributing to the improvement of the health of workers in the enterprise. In some countries, "health promotion in the workplace" is regarded as a separate discipline on its own and is carried out by completely independent groups of health workers other than occupational health professionals. In this case, their activities should be coordinated with the activities of the occupational health service, whose staff can ensure their relevance, feasibility and sustainable effect. The participation of occupational health services in the realization of health promotion programmes should not limit the performance of their main functions as specialized health services created to protect workers against harmful exposures and unhealthy working conditions in the workplace.

A very recent development in some countries (e.g., the Netherlands, Finland) is the establishment of occupational health promotion activity within occupational health services. Such activities aim at promotion and maintenance of work ability of workers by targeting early prevention and promotion actions to workers and their health, to work environment, and to work organization. The results of such activities are found to be highly positive.

Data collection and record-keeping

It is important that all medical contacts, evaluations, assessments and surveys be properly documented and the records safely stored so that, if necessary for follow-up health examinations, legal or research purposes, they may be retrieved years and even decades later.

The ILO Occupational Health Services Recommendation (No. 171) provides that occupational health services should record data on workers' health in personal confidential files. These files should also contain information on jobs held by the workers, on exposure to occupational hazards involved in their

work, and on the results of any assessment of workers' exposure to these hazards. Personal data relating to health assessments may be communicated to others only with the informed consent of the worker concerned.

The conditions under which and time during which records containing workers' health data should be kept, communicated or transferred, and the measures necessary to keep them confidential, especially when these data are computerized, are usually prescribed by national laws or regulations or by the competent authority, and governed by recognized ethical guidelines.

Research

According to the ILO Occupational Health Services Recommendation (No. 171), occupational health services, in consultation with the employers' and workers' representatives, should contribute to research within the limits of their resources by participating in studies in the enterprise or in the relevant branch of economic activity (e.g., to collect data for epidemiological purposes or participate in national research programmes). Occupational physicians involved in the implementation of research projects will therefore be bound by the ethical considerations applied to such projects by the World Medical Association (WMA) and the Council for International Organizations of Medical Sciences (CIOMS). Research in the working environment may involve healthy "volunteers", and the occupational health service should fully inform them about the purpose and the nature of the research. Each participant should give individual consent to the participation in the project. The collective consent provided by the workers' trade union in the enterprise is not enough. Workers must feel free to withdraw from the investigation at any time and the occupational health service should be responsible that they will not be subjected to undue pressure to remain within the project against their will.

Liaison and Communications

A successful occupational health service is necessarily involved in communications of many kinds.

Internal collaboration

The occupational health service is an integral part of the productive apparatus of the enterprise. It must closely coordinate its activities with occupational hygiene, occupational safety, health education and health promotion, and other services directly related to workers' health, when these operate separately. In addition, it must collaborate with all services in the operation in the enterprise: personnel administration, finance, employee relations, planning and design, production engineering, plant maintenance and so on. There should be no obstacles in reaching out to any department in the enterprise when issues of worker health and safety are involved. At the same time, the occupational health service should be responsive to the needs and sensitive to the constraints of all other departments. And, if it does not report to a most senior executive, it must have the privilege of direct access to top management in cases when important recommendations relating to workers' health are denied appropriate consideration.

In order to function effectively, the occupational health service needs the support of the enterprise management, the employer, workers and their representatives. The ILO instruments (ILO 1981a, 1981b, 1985a, 1985b) require the employer and the workers to cooperate and participate in the implementation of the organizational and other measures relating to occupational health services on an equitable basis. The employer should collaborate with the occupational health service in achieving its objectives particularly by:

- providing general information about occupational health and safety in the enterprise
- providing information on any known or suspected factors that might affect the workers' health
- providing the occupational health service with adequate resources in terms of facilities, equipment and supplies, and qualified staff
- providing appropriate authority to enable the occupational health service to perform its functions
- allowing free access to all parts and facilities of the enterprise (including separate plants and field units) and providing information about plans for changes in production equipment and supplies, as well as work processes and the organization of work, so that preventive measures can be taken before workers are exposed to any potential hazards
- giving prompt consideration to any recommendations made by the occupational health service for the control of occupational hazards and the protection of workers' health, and ensuring their implementation
- safeguarding the professional independence of occupational health professionals, encouraging and, where possible, subsidizing their continuing education and training.

Where a special plant-level programme for occupational health activities is required, the collaboration between the employer and the occupational health service is crucial in the preparation of such a programme and the activity report.

Occupational health services are established to protect and promote workers' health by preventing work injuries and occupational diseases. Many functions of occupational health services cannot be carried out

without cooperation with workers. According to the ILO instruments, workers and their organizations should cooperate with occupational health services and provide support to these services in the execution of their duties (ILO, 1981a, 1981b, 1985a, 1985b). The workers should cooperate with occupational health services in particular by:

- informing the occupational health service about any known or suspected factors in the work and the work environment that may have adverse effects on their health
- assisting occupational health staff in performing their duties in the workplace
- participating in health examinations, surveys and other activities conducted by the occupational health service
- obeying health and safety rules and regulations
- maintaining safety equipment and personal protective devices as well as first aid supplies and emergency equipment, and learning to use them properly
- participating in health education and safety training exercises in the workplace
- reporting on the effectiveness of occupational safety and health measures
- participating in the organization, planning, implementation and evaluation of activities of occupational health services.

The ILO instruments recommend the collaboration between the employers and workers on matters of occupational safety and health (ILO 1981a,1981b,1985a,1985b). This collaboration is carried out in the occupational safety and health committee of the enterprises, which comprises the representatives of workers and the employer and constitutes a forum for the discussion of matters relating to occupational health and safety. The establishment of such a committee may be prescribed by legislation or collective agreements in enterprises with 50 or more workers. In smaller enterprises, its functions are intended to be fulfilled by less formal discussions between the workers' safety delegates and the employer.

The committee has a broad range of functions (ILO 1981b) which may include:

- participating in decisions regarding the establishment, organization, staffing and operation of the occupational health service
- contributing to the occupational health and safety programme of the enterprise
- providing support to the occupational health service in the performance of its duties
- participating in the evaluation of the activities of the occupational health service and contributing to its reports submitted to subsidizing bodies, enterprise management and external authorities
- facilitating the communication of information on occupational health and safety matters between different services in the enterprise
- providing a forum for discussions and decisions on collaborative actions in the enterprise regarding matters of occupational safety and health
- evaluating the overall status of occupational health and safety in the enterprise.

The principle of workers' participation in decisions concerning their own health and safety, on changes in jobs and working environments, and on safety and health activities is emphasized in recent guidelines on occupational health practice. It also requires that workers should have access to information on the activities of the enterprise concerning occupational safety and health and on any potential health hazard that they may encounter at the workplace. Accordingly, the principle of "right to know" and transparency principles have been established or strengthened by legislation in many countries.

External collaboration

Occupational health services should establish close relations with external services and institutions. Foremost among these are relationships with the public health care system of the country as a whole and the institutions and facilities in the local communities. This starts at the level of primary health care units and extends to the level of hospital-based specialized services, some of which may also be providing occupational health services. Such relationships are important when it is necessary to refer workers to specialized health services for appropriate evaluation and treatment of occupational injuries and diseases, and also to provide opportunities for mitigating the possible adverse effects of non-occupational health problems on attendance and work performance. Collaboration with public health as well as environmental health services is important. Inviting general practitioners and other health professionals to visit the occupational health service and familiarize themselves with the demands made on their patients by occupations or the hazards to which they are exposed will not only help to establish friendly relations, but also provide an opportunity to sensitize them to the particulars of occupational health issues that ordinarily would be ignored in their treatment of workers for whom they provide general health care services.

Rehabilitation institutes are a frequent collaborative partner, particularly in the case of workers with handicaps or chronic disabilities who may require special efforts to enhance and maintain their work capacities. Such collaboration is especially important in recommending temporary job modifications that

will accelerate and facilitate the return to work of individuals recovering from serious injuries or illnesses, with occupational or non-occupational aetiology.

Emergency response organizations and first aid providers such as ambulance services, hospital outpatient and emergency clinics, poison control centres, police and fire brigades, and civic rescue organizations can ensure the expeditious treatment of acute injuries and illnesses and assist in planning for and response to major emergencies.

Appropriate links with social security and health insurance institutions can facilitate the administration of benefits and functioning of the workers' compensation system.

The competent safety and health authorities and labour inspectorates are key collaborative partners for the occupational health services. In addition to expediting formal inspections, appropriate relationships may provide support for internal occupational health and safety activities and offer opportunities to input to the formulation of regulations and methods of enforcement.

Participation in professional societies and in activities of educational/training institutes and universities is valuable for arranging continuing education for professional staff members. Ideally, the time and expenses should be subsidized by the enterprise. In addition, the collegial contacts with occupational health professionals serving other enterprises can provide strategic information and insights and may lead to partnerships for meaningful data collection and research.

The kinds of collaboration described above should be initiated from the very beginning of the operation of the occupational health service and be continued and expanded as appropriate. They may not only facilitate achievement of the objectives of the occupational health service, but may also contribute to the community and public relations efforts of the enterprise.

Infrastructures for Occupational Health Services

Infrastructures for the provision of occupational health services are insufficiently developed in most parts of the world, including developed and developing countries. The need for occupational health services is particularly acute in the developing and newly industrialized countries, which contain eight out of ten of the world's workers. If organized appropriately and effectively, such services would contribute significantly not only to workers' health, but also to the overall socio-economic development, productivity, environmental health, and the well-being of countries, communities and families (WHO 1995b; Jeyaratnam and Chia 1994). Effective occupational health services can not only reduce avoidable-sickness absenteeism and work disability, but also help to control the costs of health care and social security. Thus, the development of the occupational health services covering all workers is fully justified with regard to both workers' health and the economy.

Infrastructures for the provision of occupational health services should permit effective implementation of activities needed to meet the objectives of occupational health (ILO 1985a, 1985b; Rantanen, Lehtinen and Mikheev 1994; WHO 1989b). To allow the necessary flexibility, Article 7 of ILO Convention No. 161 provides that occupational health services may be organized as a service for a single undertaking or as a service common to a number of undertakings. Or, in accordance with national conditions and practice, occupational health services may be organized by the undertakings or groups of undertakings concerned, public authorities or official services, social security institutions, any other bodies authorized by the competent authority, or any combination of the above.

Some countries have regulations relating the organization of occupational health services to the size of the enterprise. For example, larger enterprises have to establish their own in-plant occupational health service while medium-sized and small enterprises are required to join group services. As a rule, legislation allows flexibility in the choice of structural models of occupational health services in order to meet local conditions and practices.

Models of Occupational Health Services

To meet the occupational health needs of enterprises which vary widely with respect to type of industry, size, type of activity, structure and so on, a number of different models of occupational health services have been developed (Rantanen, Lehtinen and Mikheev 1994; WHO 1989). In developing and newly industrialized countries, for example, where health care for the general population may be deficient, the occupational health service may provide primary non-occupational health care to the employees and their families as well. This has also been successfully implemented in Finland, Sweden and Italy (Rantanen 1990; WHO 1990). On the other hand, the high level of worker coverage in Finland has been made possible by organizing municipal health centres (PHC units) providing occupational health services for workers in small-scale enterprises, the self-employed and even small worksites operated by large enterprises that are scattered throughout the country.

In-plant (in-company) model

Many large industrial and non-industrial enterprises in both the private and public sectors have an integrated, comprehensive occupational health service on their premises that not only provides a full range of occupational health services, but may also provide non-occupational health services to workers and their families, and may carry out research. These units usually have multidisciplinary staff that may include not only occupational physicians and nurses, but also occupational hygienists, ergonomists, toxicologists, occupational physiologists, laboratory and x-ray technicians, and possibly physiotherapists, social workers, health educators, counsellors and industrial psychologists. Occupational hygiene and safety services may be provided by the staff of the occupational health service or by separate units of the enterprise. Such multidisciplinary units are usually afforded only by large (often multinational) enterprises and their quality of services and impact on health and safety is most convincing.

Smaller enterprises may have an in-plant unit that is staffed by one or more occupational health nurses and a part-time occupational physician who visits the unit for several hours a day or several times a week. A variant is the unit staffed by one or more occupational health nurses with an "on-call" physician who visits the unit only when summoned and usually provides "standing orders" which authorize the nurse to perform procedures and dispense medications that are normally the prerogative of licensed physicians only. In some instances in the United States and England, these units are operated and supervised by an external contractor such as a local hospital or a private entrepreneurial organization.

Due to various reasons, the occupational health staff may sometimes become more and more separated from the central operating structure of the enterprise, and, as result, the range of services it provides tends to shrink to first aid and treatment of acute occupational injuries and illnesses and the performance of routine medical examinations. Part-time and particularly on-call physicians often do not acquire the necessary familiarity with details of the kinds of jobs being performed or the working environment, and may not have enough contact with managers and the safety committee or do not have enough authority to effectively recommend appropriate preventive measures.

As part of the reductions in workforce seen at times of recession, some large enterprises are shrinking their occupational health services and, in some instances, eliminating them entirely. The latter may occur when an enterprise with an established occupational health service is acquired by an enterprise that had not maintained one. In such cases, the enterprise may contract with external resources to operate the in-plant facility and employ consultants on an ad hoc basis to provide such specialized services as occupational hygiene, toxicology and safety engineering. Some enterprises choose to retain an expert in occupational and environmental health to serve as an in-house medical director or manager to coordinate the services of the external providers, monitor their performance, and provide advice to top management on matters relating to employee health and safety and environmental concerns.

Group or inter-enterprise model

Sharing of occupational health services by groups of small or medium-sized enterprises has been widely used in industrialized countries such as Sweden, Norway, Finland, Denmark, the Netherlands, France and Belgium. This enables enterprises that are individually too small to have their own services, to enjoy the advantages of a well-staffed, well-equipped comprehensive service. The Slough Plan, organized some decades ago in an industrial community in England, pioneered this type of arrangement. In the 1980s, interesting experiments with regional occupational health centres organized in Sweden were found to be feasible and particularly useful for mid-sized enterprises, and some countries, such as Denmark, have made efforts to increase the size of the shared units to allow them to provide a broader range of services instead of splitting them into smaller monodisciplinary units.

A frequently encountered disadvantage of the group model compared to the in-plant model of larger enterprises is the distance between the worksite and the occupational health service. This is important not only in cases requiring first aid for more serious injuries (it is sometime more prudent to send such cases directly to a local hospital, bypassing the occupational health unit) but because more time is usually lost when workers are forced to go off the premises when seeking health services during working hours. Another problem arises when the participating enterprises are unable to contribute sufficient funds to sustain the unit which is forced to close down when the government or private foundation grants that may have subsidized its start-up are no longer available.

Industry-oriented (branch-specific) model

A variant of the group model is the joint use of an occupational health service by a number of enterprises in the same industry, trade or economic activity. Construction, food, agriculture, banking and insurance are examples of sectors that have made such arrangements in Europe; such models are found in Sweden, the Netherlands and France. The advantage of this model is the opportunity for the occupational health service to concentrate on the particular industry and accumulate special competence in addressing its problems. Such a model for the construction industry in Sweden provides sophisticated, high-quality, multidisciplinary services for the entire country and has been able to conduct research and develop programmes dealing with problems specific to that industry.

Hospital outpatient clinics

Hospital outpatient clinics and emergency rooms have traditionally provided services to injured or sick workers who seek care. A notable disadvantage is the lack of familiarity with occupational diseases on the part of the usual staff and attending physicians. In some instances, as noted above, occupational health services have made arrangements with local hospitals to provide certain specialized services and fill the gap either by collaborating in the care or educating the hospital staff about the kinds of cases that may be referred to them.

More recently, hospitals have begun to operate special occupational health clinics or services that are compared favourably to the large in-plant or group services described above. They are staffed by physicians specialized in occupational health who may also conduct research involving the kinds of problems they see. In Sweden, for example, there are eight regional clinics of occupational medicine, several of which are affiliated with a university or medical college, each providing services to enterprises in several communities. Several have a special unit to serve small enterprises.

A significant difference between the group services and the hospital-based activity is that in the case of the former, the participating enterprises usually share ownership of the occupational health service and have the decision-making authority over how it operates, while the latter operates as a private or public polyclinic that has a provider-customer relationship with the client enterprises. This limits, for example, the extent to which participation and collaboration between employers and workers can influence the operation of the unit.

Private health centres

The private health centre model is a unit usually organized by a group of physicians (it may be organized by a private entrepreneurial organization that employs the physicians) to provide several types of outpatient and sometimes also hospital-based health services. The larger centres often have a multidisciplinary staff and may offer occupational hygiene and physiotherapy services, while smaller units usually supply only medical services. As in the hospital clinic model, the provider-client relationship with participating enterprises may hinder implementation of the principle of employer and worker involvement in formulating policies and procedures.

In some countries, private health centres have been criticized for being too much oriented to curative clinical services provided by the physicians. Such criticism is justified in the case of smaller centres where the services are provided by general practitioners instead of health professionals experienced in occupational health practice.

Primary health care units

Primary health care units are usually organized by municipal or other local authorities or by the national health service, and usually provide both preventive services and primary health care. This is the model strongly recommended by the WHO as a means of providing services to small-scale enterprises and, particularly, to agricultural enterprises, the informal sector and the self-employed. Since general physicians and nurses usually lack specialization and experience in occupational health, the success of this model critically depends on how much training in occupational health and occupational medicine can be arranged for the health professionals.

An advantage of this model is its good coverage of the country and its location in the communities where the people it serves work and live. This is a particular advantage in serving agricultural workers and the self-employed.

A weakness is its concentration on general curative health services and treatment of emergencies with only limited ability to carry out surveillance of the working environment and to institute preventive measures needed in the workplace. Experience in Finland, where large primary health care units employ teams of trained specialists to provide occupational health services is, however, highly positive. Interesting new models for providing occupational health services by primary health care units have been tried in the Shanghai area of China.

Social security model

In Israel, Mexico, Spain and some African countries, for example, occupational health services are provided by special units organized and operated by the social security system. In Israel, this model is essentially similar in structure and operation to the group model, while elsewhere it is usually oriented more to curative health care. The specific feature of this model is that it is operated by the organization responsible for workers' compensation for occupational injuries and diseases. While curative and rehabilitative services are provided, the emphasis on controlling social security costs has led to priority being given to preventive services.

Selecting a Model for Occupational Health Services

The primary decision of whether or not to have an occupational health service may be determined by law, by a labour-management contract, or by management's concerns about employees' health and safety. While many enterprises are motivated toward a positive decision by awareness of the value of an occupational health service in maintaining their productive apparatus, others are impelled by such economic considerations as controlling the costs of workers' compensation benefits, avoidable sickness absenteeism and disability, early retirement for health reasons, regulatory penalties, litigation and so on.

The model for providing occupational health services may be dictated by laws or regulations which may be general or applicable only to certain industries. This is generally the case with the social security model, in which the client enterprises have no other option.

In most instances, the model selected is determined by such factors as the size of the workforce and its demographic characteristics, the kinds of work they do and the workplace hazards they encounter, the location of the worksite(s), the kind and quality of health services available in the community and, perhaps most important, the affluence of the enterprise and its ability to provide the requisite financial support. Sometimes, an enterprise will launch a minimal unit and enlarge and expand its activities as it proves its worth and earns the acceptance of the workers. Only a few comparative studies have been conducted so far on the operation of various models of occupational health services in different situations.

Occupational hygiene services

International instruments and guidelines strongly recommend the inclusion of occupational hygiene services in the multidisciplinary occupational health service. In some countries, however, occupational hygiene is traditionally carried out as a separate and independent activity. Under such circumstances, collaboration with other services involved in occupational safety and health activities is necessary.

Safety services

Safety services are traditionally carried out as a separate activity either by safety officers or safety engineers who are employees of the enterprise (ILO 1981a; Bird and Germain 1990) or by some form of consulting arrangement. In the in-plant safety service, the safety officer is often also the chief responsible for safety in the enterprise and represents the employer in such matters. Again, the modern trend is to integrate safety along with occupational hygiene and occupational health and other services involved in occupational health activities in order to form a multidisciplinary entity.

Where safety activities are carried out in parallel with those of occupational health and occupational hygiene, the collaboration is necessary particularly as regards the identification of accident hazards, risk assessment, planning and implementation of preventive and control measures, education and training of managers, supervisors and workers, and collecting, maintaining and registering records of accidents, and the operation of any control measures that are instituted.

Staffing of the Occupational Health Service

Traditionally, the occupational health service is staffed by an occupational health physician only, or a physician and a nurse who, perhaps with the addition of an industrial hygienist, may be designated as the "core" staff. The most recent provisions, however, require that whenever possible the occupational health staff should be multidisciplinary in composition.

The staff may be enlarged to a full multidisciplinary team depending on the model of the service, the nature of the industry and the types of work involved, the availability of the various specialists or of programmes for training them, and the extent of the available financial resources. When not actually on the staff, the supplementary staff positions may be filled in by external support services (WHO 1989a, 1989b). They may include safety engineers, mental health specialists (e.g., psychologists, counsellors), work physiologists, ergonomists, physiotherapists, toxicologists, epidemiologists and health educators. Most of these are rarely included in the full-time staff of the occupational health service and are involved on a part-time or an "as needed" basis (Rantanen 1990).

Since quantitative needs for occupational health staff vary widely depending on the enterprise in question, the organization model and the services provided by the occupational health service, as well as on the availability of support and parallel services, it is not possible to be categorical about the numerical size of the staff (Rantanen 1990; Rantanen, Lehtinen and Mikheev 1994). For example, 3,000 workers in one large enterprise require a smaller staff than would be needed to provide a similar range of services for 300 workplaces with 10 employees each. It has been noted, however, that at present in Europe, the usual proportion is one physician and two nurses to serve from 2,000 to 3,000 workers. The variation is wide, ranging from 1 per 500 to 1 per 5,000. In some countries, decisions on the staffing of the occupational health service is made by the employer on the basis of the kinds and volume of services provided, whereas in a number of countries the number and composition of occupational health staff are stipulated by legislation. For example, recent legislation in the Netherlands requires that the occupational health team must consist at least of a physician, a hygienist, a safety engineer and an

expert in labour/organization relations (Ministerial Order on the Certification of SHW Services and Expertise Requirements for SHW Services 1993).

Many countries have formulated official or semi-official competence criteria for occupational physicians and nurses, but those for the other disciplines have not been established. The new European Union principles call for confirmation of the competence of all occupational health specialists, and some countries have established certification systems for them (CEC 1989; Ministerial Order on the Certification of SHW Services and Expertise Requirements for SHW Services 1993).

Training curricula for occupational health specialists are not well developed, apart from those for occupational physicians, nurses and, in some countries, occupational hygienists (Rantanen 1990). The establishment of curricula at all levels for all of the specialist categories, including programmes for basic, postgraduate and continuing education, has been encouraged. It is also deemed desirable to include training elements of occupational health at the level of basic education, not only in medical schools but also in other institutions such as technical universities, faculties of science and so on. In addition to the background in science and practical skills needed for occupational health practice, the training should include development of appropriate attitudes towards protection of workers' health. Training in collaboration with specialists in other disciplines would enable a multidisciplinary approach. Training in collaboration with competent authorities and employers is also deemed necessary.

The professional identity of occupational health specialists needs to be supported on an equitable basis among the various disciplines. Strengthening their professional independence is crucial for efficient performance of their duties and may increase interest of other health professionals in developing lifelong careers in occupational health. It is important that the training curricula be reorganized while countries are developing new competence and certification criteria for occupational health specialists.

Infrastructures for Support Services

The majority of enterprises cannot afford the comprehensive multidisciplinary occupational health service needed for their occupational health and safety programmes. In addition to basic services provided for the enterprise, the occupational health service itself may need technical expertise in such areas as (Kroon and Overeynder 1991; CEC 1989; Rantanen, Lehtinen and Mikheev 1994):

- occupational hygiene (measurement and analysis)
- ergonomics
- information and advice about new problems and approaches to their solution
- organizational development
- psychology and stress management
- newer developments in control measures and equipment
- research support.

Countries have used different approaches to the organization of such services. For example, Finland has an Institute of Occupational Health with six regional institutes to supply expert support for front-line occupational health services. Most of the industrialized countries have such a national institute or a comparable structure with research, training, information and consultation services as its main functions; they are rare in the developing countries. Where such an institute does not exist, these services may be provided by university research groups, social security institutions, national health service systems, governmental occupational health and safety authorities and private consultants.

Experiences from industrialized countries have demonstrated the advisability of creating in each industrializing and newly developing country a special centre for occupational health research and development that can:

- provide support for policy development, evaluation and monitoring
- provide continuous scientific support for setting standards and occupational exposure limits
- develop and implement criteria for evaluating competence in the various occupational health disciplines
- provide and promote the creation of educational and training programmes to increase the number and competence of occupational health specialists
- provide information and advice on occupational health matters not only to those in the field but also to managers, labour unions, government agencies and the general public
- conduct or commission needed research in occupational health and safety.

When an individual institute is not able to supply all of the needed services, networking among several service units such as universities, research institutions and other such organizations may be needed.

Financing of Occupational Health Services

According to the ILO instruments, the primary responsibility for financing occupational health and safety services rests with the employer, with no charge being made to the workers. In some countries, however, there are modifications of these principles. For example, costs for the provision of occupational health services may be substantially subsidized by the social security institution. A case in point is Finland, where the primary financial responsibility is on the employer but 50% of the costs will be reimbursed by the social insurance institution provided there is evidence of compliance with the occupational health and safety regulations and the occupational safety and health committee of the enterprise confirms that the occupational health services have been properly provided.

In most countries, such national systems of reimbursement are available. In the community health centre model for the delivery of occupational health services, the start-up costs for facilities, equipment and personnel are met by the community, but operating costs are met by collecting fees from employers and from the self-employed.

The reimbursement or subsidy systems are intended to encourage the availability of services to enterprises with economic constraints, and particularly to small-scale enterprises which rarely can command adequate resources. The effectiveness of such a system is shown by the experience in Sweden in the 1980s, in which the allocation of substantial amounts of government financing to subsidize occupational health service for enterprises in general and particularly for small-scale enterprises increased the proportion of covered workers from 60% to over 80%.

Quality Systems and Evaluation of Occupational Health Services

The occupational health service should continually evaluate for itself its objectives, activities and results achieved as regards the protection of workers' health and the improvement of the working environment. Many enterprises have arrangements for periodic independent audits by specialists in the organization or by external consultants. In some countries, there are governmental or private mechanisms for periodic recertification based on formal audit protocols. In some enterprises, periodic employee surveys provide useful indications of workers' regard for the occupational health service and their satisfaction with the services it provides. To be truly valuable, there must be a feedback of the results of such surveys to participating employees, and evidence that appropriate actions are being taken to address any problems they disclose.

Many of the industrialized countries (e.g., the Netherlands and Finland) have initiated the use of the ISO 9000 series standards in developing quality systems for health services in general as well as for occupational health services. This is particularly appropriate because many client enterprises are applying such standards to their production processes. Some enterprises which have included their occupational health services in the application of Total Quality Management (also known as Continuous Quality Improvement) throughout their organizations have reported a positive experience in terms of improved quality and smoother operation of services.

In practice, the application of a programme of continuous quality improvement means that each department or unit of the enterprise analyses its functions and performance, and institutes any changes needed to bring their quality to an optimal level. The occupational health service should not only be a willing participant in this effort but should make itself available to ensure that considerations of workers' health and safety are not overlooked in this process.

Evaluation of the quality of occupational health services not only serves the interests of the employers, workers and the competent authorities, but also the interests of the providers of the services as well. Several schemes for such evaluation have been developed in a number of countries. For practical purposes, the self-evaluation by the occupational health service staff itself may be the most practical, particularly when there is a health and safety committee to assess the results of such evaluation.

There is a growing interest in examining the economic aspects of occupational health and safety services and validating their cost-effectiveness, but few such studies have yet been reported.

Stepwise Development of Occupational Health Services

The ILO Occupational Health Services Convention, 1985 (No. 161) and its accompanying Recommendation (No. 171) encourage countries to develop progressively occupational health services for all workers, in all branches of economic activity and in all undertakings, including those in the public sector and the members of production cooperatives. Some countries have already developed well-organized services based on provisions stipulated by their legislation.

Starting with established services, there are three strategies for further development: extending the full spectrum of activities to cover more enterprises and more workers; expanding the content of occupational health services offering only core services; and stepwise expansion of both the content and the coverage.

There have been discussions of the minimum activities that should be provided by an occupational health service. In some countries, they are limited to health examinations conducted by specially authorized physicians. In 1989, the WHO/European Consultation on Occupational Health Services (WHO 1989b) proposed that the minimum should comprise the following core activities:

- assessment of occupational health needs
- preventive and control actions directed to the work environment
- preventive activities directed to the worker
- curative activities limited to first aid, diagnosis of occupational diseases, rehabilitation on return to work
- follow-up and evaluation of statistics of occupational injuries and diseases.

In practice, there exist a large number of workplaces around the world that have not yet been able to provide any services to their workers. Consequently, the first step for a national programme may be limited just to establishing occupational health services providing these core activities for those most in need.

Future Perspectives for Occupational Health Services Development

The future development of occupational health services depends on a number of factors in the world of work and on national economies and policies as well. The most important trends in industrialized countries include ageing of the workforce, increase of irregular employment patterns and working schedules, distant work (telework), mobile workplaces and the steady increase in small-scale enterprises and the self-employed. New technologies are introduced, new substances and materials are used, and new forms of work organization appear. There is pressure for simultaneously increasing productivity and quality, resulting in the need to maintain strong motivation for work in the face of the increasing tempo of change, and the need to learn new work practices and methods grows apace.

While measures to combat traditional occupational hazards have been successful, particularly in industrialized countries, these hazards are not likely to totally disappear in the near future and they will still represent danger even though for smaller populations of workers. Psychological and psychosocial problems are becoming dominant occupational hazards. The globalization of the world economy, the regionalization and the growth of multinational economies and enterprises are creating an internationally mobile workforce and resulting in the exportation of occupational hazards to areas in which protective regulations and constraints are weak or non-existent.

In response to these trends, the Second Meeting of the WHO Collaborating Centres in Occupational Health (the Network of 52 National Institutes of Occupational Health) held in October 1994 developed the Global Strategy on Occupational Health for All with particular relevance to future development of occupational health practice. With regard to further development of occupational health services, the following emerging issues will have to be met in the future:

- universal development of occupational health for all in order to equalize the conditions of work and health in all parts of the world
- developing better predictive methods for assessing in advance health risks of exposures and providing health and safety criteria for industrial planners, designers and engineers
- improving the integration of occupational health services with other services of the enterprise
- developing improved systems for providing occupational health services to small enterprises, agricultural workers and the self-employed
- accelerating and improving the assessment of the potential hazards introduced by new technologies, materials and substances
- strengthening the strategies and methodologies applicable in dealing with the psychosocial aspects of work, with special attention to controlling hazards and preventing their adverse effects
- improving the capability for preventing and controlling musculoskeletal disorders, cumulative strain injuries and occupational stress
- increasing attention to the needs of ageing workers and improving the methods for their adaptation to work and the maintenance of work capacities
- developing and enhancing programmes for maintaining the work capacities of the unemployed and facilitating their re-employment
- increasing the numbers and competence of professionals in many disciplines involved in occupational health and safety and recognizing the need for involvement of such new disciplines as the science of work organization, quality management and health economics.

To summarize, occupational health services will face formidable challenges during the next decade and beyond in addition to the economic, political and social pressures inherent in changing national and industrial configurations. They include the occupational health problems linked with new information technologies and automation, new chemical substances and new forms of physical energy, the hazards of new biotechnologies, relocation and international transfer of hazardous technologies, ageing of the workforce, the special problems of such vulnerable groups as the chronically ill and the handicapped, as

well as the unemployment and relocations forced by job-seeking, and the appearance of new and hitherto unrecognized diseases that may affect the workforce.

Conclusions

Occupational health infrastructures are insufficiently developed to meet the needs of workers in all parts of the world. The need for effective occupational health services is growing rather than decreasing. The ILO instruments on occupational health services and the parallel WHO strategies provide a valid basis for the significant development of occupational health services, and should be used by each country as it sets policy objectives to ensure the health and safety of workers in the country.

The developing and newly industrialized countries contain approximately 8 out of 10 of the world's workers, and no more than 5 to 10% of this working population has access to adequate occupational health services. In many industrialized countries this proportion rises to no higher than 20 to 50%. If such services could be organized and provided for all workers it would not only favourably influence workers' health, but also have a positive influence on the well-being and economic status of the countries, their communities and their whole populations. This would also help to control the costs of avoidable sickness absenteeism and disability and restrain the escalation of health care and social security costs.

International guidelines for effective occupational health policies and programmes are available but insufficiently applied on national and local levels. Collaboration between countries and the international organizations and among the countries themselves should be fostered to provide the necessary financial, technical and professional support needed to increase access to occupational health services.

The range and quantity of occupational health services required by an enterprise vary widely depending on conditions in the country and the community, the nature of the industry and the processes and materials used, as well as on the characteristics of the workforce. Preventive services should be given highest priority and an acceptable level of quality should be ensured.

A variety of models are available for organizing occupational health services and creating the associated infrastructures. The choice should be determined by the characteristics of the enterprise, the available resources in terms of finances, facilities, qualified personnel, the kinds of problems anticipated, and what is available in the community. Further research on the suitability of various models in different situations is needed.

Providing high-quality occupational health services often requires the involvement of a broad range of occupational health and safety, general health and psychosocial disciplines. The ideal service is staffed by a multidisciplinary team in which a number of these specialities are represented. However, even such services must turn to external sources when infrequently used specialists are required. To meet the growing need for such specialists, adequate numbers must be recruited, trained and provided with the specialization in occupational health needed for optimal effectiveness in the world of work. International collaboration should be encouraged in the collection of available information and design of its application under varied circumstances, and its dissemination through already established networks widely promoted.

Research activities in occupational health have traditionally been focused on such areas as toxicology, epidemiology and the diagnosis and treatment of health problems. More research is needed on the effectiveness of various models and mechanisms for delivering occupational health services, on their cost-effectiveness and their adaptability to different circumstances.

There are a number of goals and objectives of occupational health services, some of which may need to be reconsidered because of the constantly changing world of work. These should be reviewed and revised by the most authoritative international bodies in the light of new and emerging problems of occupational health and safety and the new modes of promoting and protecting the health of workers.

The ILO Occupational Health and Safety Conventions and Recommendations, approaches and standards embodied in them, the WHO strategies and resolutions, as well as international programmes of both organizations constitute a solid basis for national work and wide international cooperation in the further development and improvement of occupational health services and practice. Such instruments and their due implementation are particularly needed throughout the world in times of rapidly changing working life; in implementation of new technologies; and under the growing risk of setting the short-term economic and material objectives ahead of the health and safety values.