Occupational Health Sciences and Practice in the 1990s

International Perspectives

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The rapidly changing work environment and methods, increased dependence on automation, success in hygienic control of many chemicals by bringing them to lower concentration levels, and the demographic shift of working populations from production to services in industrialized countries are all factors influencing the scientific trends in research and development in occupational health and its practice.

These changes are occurring at a time in which an increasing number of countries are starting primary health care and health promotion in the workplace to deal with long-standing health problems of underserved working populations in small industries and agriculture; these have largely been unattended in many parts of the world, including some highly industrialized countries. These factors, in addition to industrialization of developing countries, are reformulating occupational sciences and approaches.

This paper presents a brief review of the highlights of modern and future trends in occupational health. This review can in no way be comprehensive of the vast areas that need to be addressed.

MAJOR TRENDS FOR THE 1990s

Protection and Promotion of Workers' Health

Despite the traditional understanding of health protection *and promotions* as the primary objectives of occupational health (ILO/WHO, 1950), some countries, such as the United States of America, identify "health promotion in the workplace" as a separate discipline on its own to be carried out by completely independent groups of health workers other than occupational health personnel. Some other countries have initiated a number of essentially preventive health programs such as cessation of smoking among working people and control of alcohol and drug abuse as "health promotion" activities. In some countries, such programs are almost nonexistent.

As for health protection of workers including preventive occupational hygiene measures, placement health examinations, and health education, the scope of coverage in many industrialized and developing countries is limited to large and some medium-sized industries. The quality of health protection measures leaves

much to be desired. For example, the application of ergonomics is limited to a small proportion of workplaces. Job enlargement as a means of preventing monotony and psychologic stress is rarely found in real practice.

Workers are becoming more aware of their rights to health and safety in the workplace. Many developing countries have instituted occupational health as a component of health care systems. Industrialized countries are discovering more evidence that investment in health protection and promotion is morally and economically rewarding. The 1990s will witness a new era in occupational health practice.

Emphasis on Workers' Participation and Life-Style

As worker's health problems are increasingly becoming recognized as multifactorial, and with the diminishing role of specific occupational hazards in disease causation, the role of the workers themselves in preventive health care will become essential. Their knowledge about work processes and hazards, as well as safe work practices, is presently a priority in vocational training and in safety education. Workers' life-style, including diet, exercise, and smoking and drinking habits are key factors in health. The workplace has always been a good setting for workers' education on these aspects.

The Underserved Working Population

The health problems of a major sector of the labor force throughout the world, particularly those employed in small industries, agriculture, and small mining operations, will continue to be of serious magnitude. More knowledge about the magnitude of their complex health problems, particularly in the Third World, may become available as more surveys and service units progress. An easy solution to health and safety problems will not be readily available, particularly in view of the following factors:

1. The long-standing heritage of occupational health as a discipline of labor administration with a limited role or no role for national health systems. Although this is gradually changing, the recognition of workers' health as a priority in public health will probably take time in many countries;
2. The limited effectiveness of occupational health legislation and workplace inspection;
3. The shortage of trained personnel in occupational health coupled with the need to improve and upgrade the training objectives and content that are available at present; and
4. The economic difficulties in many Third World countries that are likely to continue during most of the next decade.

Trends in Training of Occupational Health Personnel

Present training and education programs have to be adapted to the new dimensions of occupational health practice and science. Clearly, there are major

changes that require reconsideration of training objectives and content. These changes include: (a) new policies on primary health care strategies insofar as underserved workers are concerned; (b) new needs resulting from modern technology development; and (c) new approaches to health promotion at work.

Occupational health resources are also in need of strengthening almost everywhere. Undergraduate medical training should include occupational health as an essential component; an increasing number of medical schools are providing more hours to occupational health.

In a recent survey by WHO and its collaborating center in the Republic of Singapore, of 532 medical schools in different parts of the world, it was found that the developing countries are probably more keen about "obligatory" courses in occupational medicine than are many industrialized countries (TABLE 1). At the postgraduate level, however, the number of departments of occupational health in the schools of medicine or public health has more than doubled in the last 10 years in developing countries. These presently exist in no less than 40 countries in the Third World.

TABLE 1. Teaching of Occupational Health in Medical Schools[a]

Region	No. of Schools Surveyed	Occupational Health Obligatory	
		No.	%
Africa	34	28	82.3
Asia	214	156	72.9
Europe	155	109	70.4
Middle East	17	10	58.8
North America	112	54	48.2
Total	532	357	

[a] Data from the Department of Community Medicine, University of Singapore.

Occupational Health Sciences

Occupational Toxicology

The most outstanding expected evolution will concern internationally recommended *health-based* occupational exposure limits of toxic substances. The old methods for setting these standards may gradually disappear. Instead, as initiated by WHO, exposure limits will become a two-step procedure. The first is international agreement on health-based exposure limits, taking into account all internationally available scientific, experimental, and epidemiologic information in east and west, north and south, for examination by international committees in which East European countries will be represented. The second step is to be undertaken by national authorities in each country who will decide on *operational* limits suited for their own technologic, economic, and other factors.

Neurobehavioral Toxicology

The central nervous system is the most complex functional entity. Much is known about it, particularly in the behavioral and emotional areas. Neurotoxins constitute hundreds of thousands of chemicals about which limited information is available in spite of much advanced modern research. Even less is known about early or delayed behavioral changes due to chemical exposure. The next decade will build on the present findings, with a view to detecting and evaluating neurobehavioral toxicity at an early stage.

Occupational Toxicology of Reproduction

The fact that many chemicals have been found to produce reproductive damage in males and females is alarming. Much has been learned about chemical carcinogenesis and occupational cancer; much less is known about genotoxicity, teratogenicity, and mutagenicity in humans. There is increasing evidence of an existing relation between chemical exposure and sterility in males and females, fetotoxicity leading to abortion or stillbirth, congenital malformation, and childhood cancer. The scope of epidemiology here is obvious, although difficult, but such research must start now and grow before the turn of the century, probably through well-organized registers.

Immunotoxicology

This new field is concerned with the study of adverse affects on the immune system resulting from interaction with toxic chemicals. These adverse effects may result as a consequence of: (1) a direct or indirect action of the compound and/or its metabolite on the immune system; and (2) an immunologically based host response to the compound or its metabolites, or the host antigens modified by the compound or its metabolites. Much more knowledge is needed in the study of altered immunologic events associated with exposure of humans and animals to toxic chemicals, the study of allergy and autoimmunity caused by xenobiotics, and the study of techniques used in immunocytochemistry.

Work-Related Diseases

To what extent do work and occupational factors play a role in causation of multifactorial health problems of mankind? What is the relation between adverse psychosocial stress and coronary heart disease, hypertension, back syndrome, and allergic manifestations? To what extent does so-called "inert" dust in the workplace affect the respiratory system and the course of chronic obstructive pulmonary disease including occupational asthma? How can ergonomics be applied to prevent musculoskeletal health problems, so highly prevalent among working populations? What are the extra-auditory effects of noise and of total body vibration on the various vital systems of the body? Is it possible to quantify stress in the workplace and its health effects in a manner that would allow for monitoring and early intervention to prevent advanced health damage and even suicide? These and many other questions on work-related diseases must be addressed to elucidate where the causal relationship is *in part* rather than *in toto*, as

in the case of specific and classical occupational diseases. The application of epidemiology is a foremost necessity in the study of work-related multifactorial health problems. No occupational health professional may be qualified without adequate epidemiologic experience.

CONCLUSIONS

The 1990s will witness an ascent and increased priority for occupational health in all aspects: broader and more challenging areas of research, attention to the long-neglected working populations in developing and industrialized countries, much more self-reliance and workers' participation with an impact on life-style of workers and consequently their families, and new approaches to workers' health care that are more coordinated and interactive with community health.

These challenges and approaches require the vigorous and dynamic efforts by leaders of occupational health and the close international cooperation in research and training with the noble objective of preventing disease and promoting health of working populations in the world.