Anticipating Safety and Health Needs

HAROLD J. MAGNUSON, M.D.

FORESEEABLE changes affecting occupational health and safety needs may be considered as occurring in three areas: industrial technology, medical technology, and sociological change produced by a multiplicity of economic forces.

Technological Change in Industry

In the area of technological change, the event of greatest moment, perhaps, has been the onset of the electronic and nuclear energy age. New possibilities have opened up for the entire electromagnetic spectrum, ranging from the infrared waves to cosmic rays. We shall see an increasing use of manmade radiation not only as a source of power but also as a tool in the study of industrial processes and methods and in the control of product quality. Many predict that the peaceful use of nuclear energy will be a major influence in our civilization by 1980.

As one illustration, the microwave region has opened up broad new areas of research in many fields, with potential application to industry. Microwaves already are finding increased use in spectroscopy, radio astronomy, particle accelerators, radar, communications, and food sterilization. But, as is true of many other rapid developments, knowledge of the health effects of microwaves has not kept pace with their use.

Another technological development which has aroused considerable interest is automation. By no means new, automation has appeared in various guises, such as in automatic poison gas alarms and driverless lift trucks. Automation makes possible new products, processes, and production volumes, leading ultimately, as some expect, to larger work forces. Various industries, such as those engaged in the production of new synthetic fibers, antibiotics, and nuclear energy, critically depend on automatic controls for volume production and worker safety. That automation will find its way into more uses is indisputable. Only its degree of advance is uncertain because of the excessive cost of complete automation.

Because of its growing influence, automation deserves serious scrutiny from the standpoint of worker health. One of the most immediate problems coming to our attention is, in some instances, that of greater exposure to noise, resulting from the greater use of electrical motors and equipment in the factory. More nervous strain may also be expected from the character of automatic operations. The effect of errors is more serious, the responsibility of the maintenance worker is higher, and machines are more complex. Eye attention is also intensified by the concentration and close work and the focus on control dials, lights, and panels. As the need lessens for physical effort by workers tending automatic machines, a growth of the health problems associated with the sedentary worker may be expected. We may also expect psychological hazards to the worker from isolation, boredom, and even from increased leisure.

A third factor of health import on the technological scene is the fast-rising number of new chemicals. Figures reflecting the growth of the chemical industry stagger the imagination. Consider, for example, that there are 500,000 distinct chemical compounds in use in industrial

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Dr. Magnuson serves as chief of the Occupational Health Branch of the Public Health Service. *The paper was read at the 1959 convention of the International Association of Governmental Labor Officials, which was held in Kennebunkport, Maine, September 9–12, 1959.*

production, all but a few hundred of them unknown on this earth 20 years ago (*1*).

Among the newer, toxic chemicals we find the boranes or boron hydrides. Originally considered for high-energy fuels, these chemicals are now finding their way into industrial applications, as in new plastics. The foam plastics, which are gaining in usage, contain toxic aromatic isocyanates. Likewise, the versatile and numerous epoxy resins which have swept industry have created a problem. Practically no industry using them escapes an increased incidence of dermatitis. Sensitized workers must be removed from the job.

Other industrially important materials potentially hazardous include the organometallic compounds. The carbonyls of iron, cobalt, and nickel are now widely used as catalysts in the petroleum and petrochemical industries. Organic compounds of manganese are being studied as possible substitutes for or supplements to tetraethyl lead in gasoline. Most of these organometallic compounds are highly toxic substances.

These are but a few of a long, growing list of potentially toxic chemicals in the work environment. Continuous study and vigilance is required to determine their health effects and develop means for their control.

In addition to these new problems, we must not lose sight of the older hazards that continue to plague us. Two of the best illustrations are silicosis and lead poisoning. Although much has been accomplished through dust-control measures, silicosis remains the most significant occupational disease in the United States in terms of disability and compensation costs. Likewise, in the lead industries, despite numerous studies and the development of effective control methods, cases of lead poisoning occur every year. While large plants cannot be assumed to be free of occupational health hazards, a larger problem exists in the small plants and in the trades, where the hazards and methods for control may not be fully appreciated, rather than in the place of primary manufacture and use of chemicals.

Medical Developments

While changes in industrial technology present new challenges, advances in medical technology may be expected to provide some of the tools to meet these problems. Research on occupational diseases will undoubtedly gain momentum. Similarly, the massive research efforts to control the Nation's chief health problems hold special meaning for us, since 90 percent of industrial sickness absenteeism is believed to be of nonoccupational origin.

One approach is being made through studies to develop early, sensitive diagnostic techniques. In cancer, for example, studies are underway to apply the well-known Papanicolaou cytology technique for uterine cervical cancer to the detection of cancer of other sites. Some findings suggest that cytology can be useful in the early diagnosis of cancer of the genitourinary system. There is also hope for the development of effective anticancer drugs.

Heart diseases and related conditions are another major target. Studies in this area point, for example, to the development of an improved agent for the lowering of blood pressure in patients with hypertension. Considerable attention is also being given to reducing cholesterol, which some believe to be associated with atherosclerosis.

The benefits of some of the tools developed from this broad research may be compounded by applying them to occupational exposures. Thus, as an extension of the Papanicolaou technique, we have used bronchial washings to detect early cancer of the lung in uranium miners. In addition, work is underway to develop specific tests for occupational agents, to permit the detection and control of harmful exposure before irreversible damage occurs. Thus far, in our work in the Public Health Service, we have some indications that vanadium poisoning can be detected by changes in the fingernails long before any clinical symptoms appear. In support of better diagnostic techniques, work is also progressing in various laboratories to develop rapid analytical methods. Our own research, for example, has recently developed methods for the rapid determination of fluoride in urine, of cobalt exposures as evidenced by changes in blood serum, and a micromethod for blood lead determination.

As more sensitive diagnostic techniques are developed, we will be faced with the difficulty of equating concepts of physiological change,

as evidenced by these indexes, with the more traditional concepts of pathological change and possible compensable occupational damage.

With the advance of medical knowledge, we may also expect an increase in the number of diseases recognized as occupational. This increase would result from the greater recognition of an occupational factor in certain diseases formerly regarded as common to ordinary life, as well as the growing number of chemicals being introduced in industry.

In addition to improved recognition and detection of occupational diseases, we may look for further progress in their treatment. More recent therapeutic techniques, for instance, have used chelating agents in the treatment of certain illnesses. The chelating agents have the property of selectively removing certain metals from the circulation. For this reason, they have been found useful in treating metal intoxications, such as arsenic and lead poisoning. However, since such agents may also remove essential metals from the body, study has been needed of this possible hazard.

Sociological Developments

Against this background of change in industrial and medical technology, let us consider some of the sociological developments that influence health and safety needs. Unquestionably, the change in patterns of financing medical care is foremost. The vigorous growth of health insurance coverage reflects the conviction of the American public that the financial risks of illness need to be shared. To an increasing degree, such insurance coverage is being included in management-labor negotiations, so that both labor and management have a real concern about obtaining maximum medical care benefits at a minimum cost. At present, health insurance programs made available and paid for through the worker's place of employment cover more than 37 million employees and their 57 million dependents, a total of 94 million people (*2*).

The fact that management is increasingly obliged to bear all or part of the costs of illness, occupational or nonoccupational, has certain implications. The immediate effect has been to place increased emphasis on the prevention of nonoccupational diseases, since these represent the greatest share of sickness costs and absenteeism. Another, and to us a more important, change may be anticipated. Up to now, it has generally been to management's advantage to deny occupational factors in the illness of workers so as to avoid compensation costs. However, as the costs of illness of all types become a management concern, we may expect a shift in this thinking. Management may logically come to view the early recognition of occupational factors as an opportunity to apply primary preventive measures and reduce the overall illness cost.

Another implication of management's concern with all types of employee illness is the possible tightening up of physical requirements for new job applicants. The degree to which this may be carried out is necessarily dependent on the labor supply. In the meantime, however, a very real problem involves the compensation aspects of employing workers with degenerative illness, such as heart disease.

A conservative estimate is that at least 5 percent of the working population has some form of heart disease. As a result of the cardiovascular diseases, an estimated 653,000 man-years are lost annually (*3*).

Numerous claims have been filed for heart attacks suffered during working hours, and there has often been a wide variation of medical opinion as to whether or not the heart attack was caused by the work. Because of the divergence of medical views, the heart case in industry has been a fertile field for litigation. All too often, cases have been tried on an emotional basis rather than on scientific fact.

In New York State alone, an average of more than $4 million is paid every year for compensation of heart disease claims. This is 4 percent of the total amount awarded for all compensation claims each year (*4*).

Some action must obviously be taken if the millions of Americans with cardiac conditions are to be assured of continued employment. One possible solution may perhaps lie in the second injury fund, thereby protecting the final employer from the full brunt of the cost of a disabling illness.

Moving from this facet to the whole picture of workmen's compensation, we may expect to

see some changes here, too. The introduction of new hazards such as radiation, with long latent periods between the exposure and the appearance of damaging effects, is drawing more attention to the need for overhauling compensation practices in general and for correcting existing inequities.

Another problem calling for action relates to one of the basic goals of workmen's compensation—the rehabilitation of the occupationally disabled. We are seeing some progress in this area as the number of persons receiving help from public rehabilitation agencies and the number of those returned to productive employment increase each year. Last year, for example, 171,000 persons received rehabilitation services, and approximately 81,000 were rehabilitated to productive employment. However, our present inability to cope with the situation is reflected in the fact that some 250,000 persons each year reach the point of disability that requires rehabilitation, with an estimated reservoir of 2 million persons. Even more disturbing is the fact that, on the average, 9 years elapse between the time of disability and the time that rehabilitation is started.

A number of developments will be dictated by the changing age characteristic of our labor population. By 1965, the number of men and women in the labor force is expected to rise by 10½ million. Most of the increase will be in the 14- to 24-year-old group and in the 45-and-over age group (*5*). The increase in each group will be accompanied by its own set of problems.

The younger worker group generally is quite mobile and has a tendency to gravitate to the newer industries. The age and mobility of this group, combined with the long latent period for evidences of ill effects from certain occupational exposures, may well serve to cloak hazards inherent in those newer operations. Because of this and because some of the newer hazards could affect generations yet unborn in the families of exposed workers, we cannot wait for cases of illness to develop before taking steps to evaluate and control potentially hazardous exposures.

The problems of the older group will be felt in various areas. In the field of rehabilitation, for example, some accommodations may be necessary to meet the needs of an aging population. Some have suggested extension of the present vocational goal of the program to also help people achieve a higher level of self-care.

Another sociological influence of this age factor is evident in the estimate that by 1975 the number of physicians' services needed because of chronic disease will increase by more than 50 percent (*6*). These demands of an aging population cannot but increase the problems associated with a growing physician shortage.

It has been estimated that merely maintaining the current ratio of physicians to population will require, by 1975, something like twice as many new medical school graduates each year as we now have (*7*). Pyramiding medical research needs may also be expected to drain off larger numbers of medical personnel. A consultant group to the Secretary of Health, Education, and Welfare, headed by Dr. Stanhope Bayne-Jones, estimated that by 1970 there would be a shortage of 6,000 medical researchers, as well as shortages of technicians, nurses, and other ancillary personnel.

The shortage of trained medical, nursing, and industrial hygiene personnel is also reflected in official occupational health agencies and in industry. Dr. Robert Kehoe has estimated that there is need for 10 industrial physicians and industrial hygiene engineers for every 1 now employed (*8*).

Industry, the health professions, educational institutions, and government may have to take another hard look at present educational opportunities and facilities to see how they can infuse them with a new vitality to meet these current and projected needs.

Training of additional personnel, we recognize, is only a partial answer. Better utilization of ancillary personnel may help conserve medical manpower and provide greater opportunities for service to the other members of the professional health team.

One means to accomplish better utilization and conservation is through the application of screening techniques. The value of screening techniques has been the subject of considerable controversy, but I believe that much of it is based on lack of understanding of their purpose and use. Screening examinations were never meant to be a substitute for physical examinations. Their value lies in extending

early detection services to persons who could not otherwise be expected to have the benefit of a physical examination. This value, however, can be realized only if adequate provisions are made for referral to the private physician for followup. There is no point to finding out that an apparently well person has an elevated blood pressure, a spot on the lung, or high blood sugar unless this condition is carefully investigated by a physician. Used properly, these examinations can serve as efficient detectors of disease in early stages, at the same time substantially decreasing the demand for and costs of medical and hospital services. I believe these techniques hold great promise for industry.

Since the shortage of professional personnel extends to governmental agencies, these groups, too, can effect better utilization of their personnel through closer working relationships between labor and health departments, compensation boards, and rehabilitation agencies. All too often, the administrators of these agencies within the same State do not even know each other's names. I am convinced that many benefits would accrue if the personnel of these agencies would become acquainted with each other and explore mutual problems and opportunities.

Such cooperative efforts would further contribute to the identification and more effective study and control of new occupational health hazards. At present, there are 76 official occupational health agencies in 40 States, staffed by 484 professional personnel. This staff reaches only 10 percent of the Nation's work force in any one year. This coverage can be greatly increased by a closer working relationship between the various agencies concerned with occupational health and safety. By joining forces, we may be able to attack more successfully the absence of even the most rudimentary type of industrial hygiene program in over one-half of the industrial plants in the United States. In the face of a constant, growing stream of new hazards introduced by a changing technology, we must effectively multiply our efforts if only to stand still and not lose ground.

The total health and safety job confronting us is nothing short of gigantic. There is more than enough for all of us to do. And to the degree that we combine our resources and permit a cross-fertilization of ideas and experiences, we will make greater headway toward our mutual objective of worker protection.

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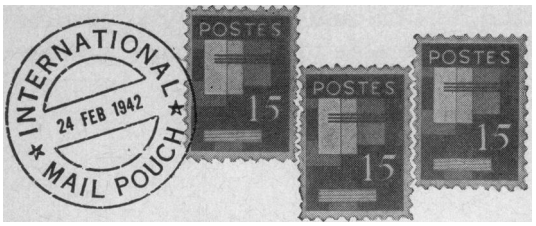

Pushing Fish

To promote the eating of fish, Morocco's Ministries of Public Health and Interior sold fresh sardines at half price (7 cents a pound) for 2 weeks to some 100,000 dwellers in shanty towns on the outskirts of Rabat. Most of them have never tasted seafood and can afford meat only once every 4 or 5 months.

The Government's aim is to develop new food habits among those whose diet is deficient in protein, to show merchants how to profit from increased sales of fish at lower prices, and to stimulate the fishing industry which is operating below full capacity.

The ministries used press, radio, and movie publicity and broadcast from loudspeaker trucks such slogans as "One and a half kilos of fish is just as nourishing as one kilo of meat—and only one-fourth the price." Social workers set up stands in the shanty towns to demonstrate how to clean and cook sardines.

The Government plans to promote canned sardines in the inland areas where there is no refrigeration.

Morocco has a fishing fleet of nearly 2,000 trawlers and other boats which catch about 100,000 tons of fish, mostly sardines, a year. Many canning factories are closed because their products are not meeting price competition in foreign markets.

Hospital on the Amazon

Far up the Amazon, on Brazil's frontier with Colombia and Peru, at Benjamin Constant is the only hospital within 500 miles. A few patients are flown to the hospital; some arrive by river boat; but most are brought by paddling hours or days in the family canoe.

We make supervisory visits there only once a year. When I arrived at the hospital in 1957, about a year after it had opened, the X-ray machine was inoperative because of a grounded cable, the electrical connections for the hot water heater were not completed, the oil burner in the kitchen was not functioning, and the flatwork ironer gave the employees shocks. The staff was anxious to learn, however, and soon, with adjustments, repairs, and instructions translated for the staff, nearly all equipment was working, and the hospital was functioning effectively.

When I returned a year later, accompanied by Dr. José Chaves, chief of medical services of the Amazon Program, all the equipment was still operational. However, an increased patient load was taxing the one doctor and one graduate nurse responsible for the care of both hospital and ambulatory patients. We offered suggestions as to clinic hours to permit more time for hospital patients and surgery and recommended to the Amazon Program Office of Serviço Especial de Saúde Pública that another doctor and graduate nurse be added to the hospital staff. The patient load, already so great that the present staff can no longer cope with it, will increase.

—KENNETH L. WINTERS, *hospital administration consultant, U.S. Operations Mission, Brazil.*

New Physicians for Indonesia

When 97 medical students were graduated from the University of Indonesia in August 1959, the new physicians, 21 of them women, took professional oaths according to their religions: Moslem, Protestant, Catholic, Hindu-Bali, or Buddhist.

The medical school of the university has collaborated with the University of California in the development of a new curriculum to increase the supply of physicians. (Indonesia now has about 1,000.) The period of training has been cut from 7 years to 6, with a new system of periodic examinations and clinical work integrated with theory.

Under a 6-year contract, the affiliation between the two universities was financed with $1,900,000 contributed by the United States. In addition, the International Cooperation Administration provided $900,000 to pay for advanced study in the United States for 125 students and $500,000 to purchase equipment. Indonesia reported spending about $6,250,000 for buildings, 10 houses for visiting professors, and administrative expenses. The University of California expects to start a similar affiliation in 1960 with the medical school at Airlangga University in Surabaja.