Research: Challenge to Health Departments

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MANY health workers have expressed concern over the disparity between the emphasis placed on medical research and application of the results of research in program activity. The reasons for this concern are easily understandable, and it should be made a matter of record that research administrators are also concerned with problems of dissemination of information and application of knowledge. Concern over a problem may be a good thing because it implies analysis, and understanding may result from the thinking that takes place during the process.

In any discussion of an issue, the principle involved should be clearly stated. Therefore, let me state that I think the evidence is quite clear that the health department's primary mission of service is accomplished best if it is based upon a firm foundation of basic research that has been applied to programs through carefully conceived developmental research. This being the case, it appears to me that the health department has a twofold role in research: one is primarily in epidemiological investigations, the other is in operational studies.

The health department's primary mission of service must not be jeopardized by any tangential activity, no matter how attractive. However, I would suggest that the professional stimulation that comes from participation in a research endeavor will, in most instances, more than compensate for the time given to the research project. This is such a well-established principle in academic institutions that faculty time is programed to include research.

Another very significant aspect of this subject is the nature of research itself. According to the one definition, research is a "studious inquiry having for its aim the discovery of new facts and their correct interpretation." This, therefore, includes orderly observation of occurrences, the accurate recording of data, and the objective analysis of the information compiled. Every day in every health department with a program worth its salt, observations are being made routinely. However, most recording of these observations is designed to furnish administrative rather than scientific information. Only a few departments make a serious effort to analyze the data in their records, so much valuable information is lost in the files.

Yet public health is the specialty that created and refined epidemiology as a technique, a procedure, and a thought process. The one health organization in the best possible position to make professional observations on groups of people is the health department. Because some of the answers to the most pressing public health problems hinge on studies of the natural history of disease, the inevitable conclusion is that health departments have a vital contribution to make through research. Perhaps I should say investment rather than contribution, because research pays dividends.

Whether the disease be infectious or noninfectious, whether it be acute or chronic in

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nature, longitudinal epidemiological studies represent the only presently known way in which a substantial part of the knowledge we must command can be marshaled adequately. The equation, as I see it, may be stated as follows: Medicine needs information that can come only from careful studies of the natural history of disease. The epidemiological method is the research system of choice. The health department, by tradition, training, position, and skill, should be better able to do this type of research than any other professional group.

I know that I am suggesting new responsibilities, but health departments have been challenged before. Their achievements are a matter of record. For example, the steadily increasing health problems of the aging and chronically ill have led Ohio health departments to forge ahead in this new field of health activity. "Programing in Long-Term Illness and Aging" was discussed at this annual conference 2 years ago. Since then some of the best diabetes programing in the country has been accomplished in this State. In addition, exploration with such new programs as glaucoma casefinding and meals-on-wheels has been carried out.

Continuing Responsibility

But the control of infectious diseases is a continuing responsibility. A few years ago Dr. Karl F. Meyer delivered the sixth R. E. Dyer lecture (*1*) at the National Institutes of Health and discussed the natural history of plague. He said: "For centuries, man's survival has been chaotically interfered with by the infectious diseases, in pandemic form, dramatically. In the last half century, man, through his intelligence and diligence, has begun to control this chaos effectively for the first time. . . . These advances are good cause for great rejoicing. They are not cause for believing that parasitism holds no further challenge to man's ingenuity. . . . Immunization . . . chemotherapy . . . both of these defenses, magnificent but temporary, leave the parasite free to carry on its usual latent existence untouched: to multiply, to adapt, and to exert its capricious effects on the hosts. . . . The everlasting question, what forces create, maintain, and suppress epidemic diseases of man and animals, has never been fully answered."

That infectious diseases go through cycles is widely recognized. Plague reached catastrophic proportions during the Renaissance. Syphilis spread as an epidemic during the 16th century. Smallpox was the scourge of the 17th and 18th centuries. The bacterial diseases, such as tuberculosis, diphtheria, and scarlet fever, next came on the scene and began to recede only as late as the early part of the 20th century. Virus diseases, exemplified by the pandemics of influenza which have occurred in the last 40 years, are among our greatest causes of concern today.

One of the earlier and more specific statements expressing this problem was made by William Parr in 1873 in a letter to the Registrar General as quoted by Hirsch (*2*): "The infectious diseases replace each other and when one is rooted out it is apt to be replaced by others which ravage the human race indifferently whenever the conditions of health are wanting. They have this property in common with weeds and other forms of life, as one species recedes another advances."

Dr. Rene J. Dubos in his extremely thoughtful treatise, "Medical Utopias," writes (*3*): "In the field of infectious disease, we need not go far for examples because the future is already with us. While mortality from acute bacterial infections is at the all-time low, chronic disorders of complex and ill-defined microbial etiology loom larger and larger on the horizon."

Therefore, we may postulate that as the health profession solves one problem through research, this very advance may create new biological equations which require solutions. The genetic instability of infectious agents with reference to chemotherapy or to spontaneous mutations provides examples. Another variant is the changing pattern of reservoirs of infectious agents. As long as a potential agent of disease continues an uninterrupted natural cycle, it may remain nonpathogenic or only mildly invasive. However, the current mobility and numerical growth of our population, the substantial changes in domestic and wild animal

life moieties, the altered nature of land usage, and many other developments tend to disequilibrate these relationships. The result is a continuous "spinning off" of newly invasive agents which are disease producing to various degrees. This pattern of biological adjustment will probably go on indefinitely.

Man's only safety from natural or overt biological warfare is the lead time achieved by research. This lead is precarious. The recent emergence of staphylococcal strains, for example, marked by their communicability and virulence and by high resistance to antibiotics, is recognized in many hospitals as the most immediately urgent of all infectious disease problems (*4*). The resistance of the anopheline mosquito to insecticides is a major threat to success of worldwide malaria eradication programs (*5*).

In my opinion methods of control can be found for almost any pathological state, but we cannot be complacent. Disease agents will change through the adaptive reactions demanded by their environments. We must maintain a constant research effort to gain adequate knowledge about infectious agents and their ecology. We must be able to understand the manner in which men respond to the infectious challenges which continue to arise from the environment.

Advances in Microbiology

The National Institute of Allergy and Infectious Diseases has reported recent work that shows we are moving forward in our understanding of microbiology. The implications in terms of future public health programing can be envisioned.

In collaboration with the Children's Hospital Research Foundation and the Washington, D.C., Welfare Department, Dr. Joseph A. Bell and his associates have demonstrated an epidemiological technique for intensive, detailed study of respiratory virus infections in a small population. They have traced a panorama of so-called undifferentiated respiratory illness, such as those caused by adenovirus, Coxsackie virus, and others. These studies in nursery and hospital groups have aided in the definition of the place of a new microbial group, the myxoviruses, in respiratory disease. These newly recognized agents were found to have caused more acute upper respiratory disease in the study group than Asian influenza during the pandemic year 1957 (*6*).

In collaboration with the animal research services of the U.S. Department of Agriculture, Dr. Robert J. Huebner and Dr. Francis R. Abinanti have demonstrated that parainfluenza virus occurs extensively in cattle. Preliminary studies (*7*) show a relationship of this virus to costly bovine respiratory diseases, particularly shipping fever. This may be a lead to recognition of a new animal reservoir of infectious agents which cause respiratory disease.

Dr. Sarah Stewart, National Cancer Institute, Dr. Bernice Eddy, Division of Biologics Standards, and their co-workers revealed a filtrable agent associated with tumor formation in mice (*8*). Huebner, Dr. Wallace Rowe, and associates (*9–11*) have applied precise virological methods to this mouse polyoma virus and have characterized it immunologically. They demonstrated its excretion in saliva, urine, and feces of infected mice, established its spread among mice by respiratory and intestinal routes, and showed it to occur as a contaminant of numerous transplantable tumors. The observations are pertinent to study of possible virus etiology in human cancer.

Dr. Carl L. Larson, Dr. Edgar Ribi, and coworkers of the Rocky Mountain Laboratory in Hamilton, Mont. (*12*), have reported a method for harvesting cell walls free of contamination with cellular protoplasm. Fractionation of tubercle bacillus cell walls suggests a more effective, less toxic immunizing antigen can be obtained free of material which causes delayed hypersensivity.

Perhaps these examples of research represent studies too intensive or specialized for the average health department to undertake, but, as I have suggested, there is a need and a role for the health department investigator in medical research.

Applications for Grants

The application for a grant from the National Institutes of Health for research or training begins with the individual investigator. Thus,

as a basic policy, the subjects of study are not prescribed, but instead follow the interest of the scientists themselves.

The application should be sponsored by the investigator's institution, since decisions must be made as to the adequacy of the research facilities available. When a grant application is received by the Institutes' Division of Research Grants, it is assigned to 1 of 33 study sections. These are composed mainly of scientists from universities and medical schools. They assess the competence of the applicant and the merits of the proposed research.

Next, the application is considered in the light of the total research program of the institutes. The matter is then brought before one of the nine National Advisory Councils, composed of non-Federal leaders in science and public affairs. The councils have two functions: they review the actions of the study sections and make final recommendations to the Surgeon General of the Public Health Service, and they advise on general program policy questions.

Following council recommendations, the Surgeon General approves or disapproves the grants. If the decision is favorable, the Division of Research Grants handles the mechanics of payment.

So far as I have been able to determine, more professional and scientific people have participated in this program through membership on advisory councils and study sections than in any other medical research program in history. This broad participation by the scientific community is, we think, one of the great strengths of the extramural grants program.

In summary, it has been my purpose to describe the research grants program of the National Institutes of Health, to point out the health department's unique opportunity for productive research in the natural history of disease, and to explore the concept that infectious disease research today is prologue to the control measures of tomorrow. I am sure that great new challenges and opportunities for service lie ahead for the public health departments.

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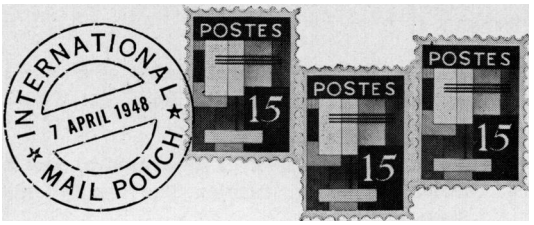

Noncoercive Campaign

Reduced consumption of wine in 1959, which had been steadily increasing since 1946, and a 25 percent drop in deaths directly attributable to alcohol marked the first victories in France's noncoercive campaign against alcoholism. It has been estimated that 10 percent of the men and 3 to 4 percent of the women are excessive drinkers.

The campaign against alcoholism has three major facets: a public appeal to promote moderation, increased sales of nonalcoholic drinks at reasonable prices, and the prevention of economic dislocation in a major industry.

For several years demographic specialists, physicians, and sociologists, under the aegis of the Alcohol Research and Information Council, an organization created by the office of the Prime Minister, have been working with services of the Ministry of Health; the Committee for Protection against Alcoholism, a voluntary organization; and the Social Security Service.

Studies in 1955 and 1957 revealed that 7 out of 10 Frenchmen believed that the campaign against alcoholism was necessary, but that aperitifs and spirits were to blame for the damage caused by alcohol. The public also honestly believed that an average of 2 or 3 liters of wine per day was reasonable consumption.

This has been termed a fallacy, for alcoholism in France is primarily a matter of wine drinking; 70 to 80 percent of the 30 liters of pure alcohol that the "average Frenchman of the statisticians" absorbs annually are in the form of wine. Therefore, the public appeal was aimed at moderation in wine drinking. The maximum quantities suggested were 1 liter per day for a heavy laborer, three-fourths of a liter for a less active worker, and a half a liter for a sedentary worker.

A measure of the success of the public appeal was the fact that 8 out of 10 people who had heard of the campaign understood correctly that its aim was moderation, and half of these knew that a liter was the maximum quantity that should be drunk each day.

Other indications were more definite. Mortality rates from alcoholism decreased in 1958 after increasing 12 times from 1946 to 1956. Mortality rates from cirrhosis of the liver, which had increased six times over the same 10-year period, were 12 percent less. Consumption of aperitifs has been decreasing since 1952. Consumption of wine dropped 500 million liters between 1956–57 and 1958–59, and the trend is continuing.

Drinking of fruit juice, still relatively modest, increased 30 percent per year over the same period. The council announced that an important firm of fruit juice distributors was launching a campaign to sell grape juice at 25 cents a liter, and an important wine cooperative intends to market its own grape juice at a price not more than that of wine.

The economic effects of reduced consumption will have to be offset by increased exports of quality wines and spirits. It has been calculated that an 8 percent reduction of consumption of these better qualities within France would enable the profits from exports to be doubled.

—Excerpted from *World Health*, January–February 1960.

Sleep Brigades

In Cabinda, a wedge of Angola north of the Congo River, five mobile groups called sleep brigades battle the scourge of sleeping sickness. Each group consists of a physician, 2 nurses, 21 microscope technicians, 10 sanitary workers, an administrator, 3 drivers, and 12 servants. In the period from 1949 to 1958 the number of persons with the disease dropped from 15,785 to 917. In some years 5,000 to 6,000 people were examined.

Sleeping sickness, which once dominated nearly 5 million square miles south of the Sahara, is receding. Although some regions are still deserted, the spread of the disease has been stopped as far as man is concerned. However, it still affects cattle; nagana, as it is sometimes called, hinders the development of cattle raising.

—Excerpted from *World Health*, November–December 1959.