Prospects for Chronic Disease Research in Health Departments

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ARE THERE particular types of chronic disease research which are best carried out in an official health agency and, if so, what are the characteristics that equip an agency for such endeavors? Because the official health agency is legally responsible for protecting, maintaining, and improving the health of the population, certain types of chronic disease research are possible which otherwise would be difficult, if not impossible, to undertake. A case in point is the development and exploitation of chronic disease case registers, especially those covering conditions to which a social stigma is attached.

From the standpoint of social and economic significance, narcotic addiction is of major concern in many large cities. One of the great difficulties in controlling it arises from the lack of any solid, scientific data on the characteristics and distribution of addicts in the community, on their morbidity and mortality rates, and on the effectiveness of proposed methods of treatment. Estimates of the prevalence of narcotic addiction in New York City, for example, run all the way from a few thousand cases to several hundred thousand. Only the official agency is in a position to collect the information to fill the gaps.

In 1964, the New York City Department of Health, with the aid of a grant from the National Institute of Mental Health, began the systematic development of a register of narcotic addicts. In the period 1953-62, before the register was established, the annual number of reports received on narcotic addiction was around 3,000 to 4,000. In 1963, when steps to develop a register were taken, the number jumped to 13,000. The reports increased to 15,000 in 1964 and to 21,000 in 1965. In the first 6 months of 1966, the number of reports received reached 21,000. Of course, not all these reports represent different persons. At present about 35,000 separate names are estimated to be on the register. As time goes on, it is clear that better estimates of prevalence will become available.

With respect to incidence, about 9,000 new cases were reported in 1963 and 7,400 in 1964. In time, given reasonably complete reporting and no change in the underlying factors giving rise to drug addiction, this number can be expected to level off at some point proportional to the incidence of addiction.

Many problems have to be solved in developing a register of drug addicts. The difficulty of achieving completeness of reporting has already been mentioned, and studies on ways to attain

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it are being made. The fundamental problem is the definition of an addict. Of necessity, we have had to take a pragmatic approach. If the case is reported by an agency in a position to make a medical determination or if the report is verified from a second source, the person is considered an addict. Obviously, there is room here for research.

Then there is the question of how long a person should be kept on the register. Is it correct to assume that once an addict, always an addict? At present, arbitrary regulations on this subject prevail in different countries, but so far as is known they are not based on actual data. Analysis of the length of time between successive reports to the register concerning a given person should yield some clues as to the duration of addiction. Followup studies of appropriate samples from the register should also throw light on the question.

The potentials for followup studies, once the register is established, are tremendous. A determination of mortality rates and of their variation with the characteristics of the addicts should be possible. This information alone would be an enormous advance in knowledge about this chronic disease of narcotic addiction.

The ability of the official agency to develop a register of drug addicts makes possible a whole class of research concerned with determining the effectiveness of treatment, research which may or may not be carried out by the official agency. Almost all attempts to evaluate treatment require comparative data on narcotic addicts in general, against which to judge its effectiveness, not only in regard to such health indicators as mortality, but also in respect to such social factors as employment, involvement with law enforcement agencies, and so forth. Moreover, the data obtained by the official agency from the register permit a judgment as to the significance of a particular therapeutic approach from the community standpoint. Certain therapy may have been successful on those addicts on whom it has been tried. If addicts with similar characteristics, however, comprise only a small proportion of all addicts, the value of that particular therapy from the community standpoint must be critically reviewed.

The preceding review of narcotic addiction

illustrates that some of the most fundamental research in chronic diseases would be extremely difficult without certain information which is available only through official agencies. These agencies need to recognize and accept their unique responsibilities in chronic disease research.

There are other types of case registers of chronic disease in which the official sanction of the health agency is almost a sine qua non to the development of sound epidemiologic research. Many aspects of mental health might well be investigated through appropriate registers. The work of Kramer, Bahn, and others of the National Institute of Mental Health of the Public Health Service (1) represents one approach to providing the basic factual information necessary for progress in the understanding and control of these chronic conditions.

In cancer research, many investigators have turned for basic, factual information to the data provided by the Connecticut cancer register (2). In California, the State health department has attempted to use the cancer registry as a tool in a study of the quality of care given in institutions treating cancer patients (3).

Certain types of service demonstrations under the fiat of official agencies may also offer research opportunities. For example, the New York City Department of Health in 1962 undertook a demonstration referral program for young men rejected by the selective service system for health reasons (4). The program began at the time of the man's selective service examination. The health department undertook to interview and refer the rejectees to whatever agency, if any, was required to treat the conditions found. The majority of these conditions were chronic.

Any organization except the official health agency would have had difficulty in undertaking such a program for several reasons. First, the young men came from all over the city. Second, referrals had to be made to many different kinds of agencies, all of which recognized the right of the official health agency to be concerned with the problem. Third, the health department's reputation within the community often helped in dealing with the rejectee.

The mark of good research, it is sometimes said, is the number of new questions it raises. Certainly the selective service demonstration project gave rise to a number of interesting ones. For example, what relations do the results of a youth's school health examinations and academic records have to the probability of his being rejected or deferred at the time of the selective service examination? Ciocco and associates in Hagerstown (5) examined this question on a small scale a number of years ago, but the opportunity to look at it again with larger numbers in a different setting with different populations became available as a result of the New York City referral project. The study is still in process.

About 38 percent of the men rejected in New York City for health reasons were classified by the selective service examiners as having one or another psychiatric condition. Implicit in attempts to develop a program for these men was the assumption that the treatment to which they were referred would be effective if they could be persuaded to undertake it. One ought to ask, particularly since the health department was not as successful as it would have liked to have been in getting these men under treatment, what happens to such men if they are left to their own devices? They were rejected as being unfit for military service, but this rejection did not necessarily make them unfit for coping with civilian life. A useful contribution to an understanding of the natural history of mental health problems would be a followup study of an appropriate sample of the men who were rejected for psychiatric reasons.

Using Research Results in Programs

Every health department bears the responsibility for translating the knowledge gained from laboratory, clinical, and epidemiologic research into effective public health programs. The task is particularly difficult with the chronic diseases because the application of available knowledge so often requires a face-to-face relationship with individual members of the population over an extended period. Moreover, these diseases are not amenable to general environmental controls or to immunization procedures.

The Framingham and other studies have delineated some of the characteristics of the

person who is heart-disease prone. He is likely to be overweight, to have a high cholesterol level and high blood pressure, and to smoke a lot. To this extent at least, these studies have defined the high-risk group, and it is a general principle of health department administration that the most effective use of limited resources is to concentrate upon high-risk groups. So far as I know, it has not yet been definitively shown that reducing a person's weight, blood pressure, or cholesterol or that elimination of smoking will correspondingly reduce the incidence of coronary disease. Nevertheless, it would seem useful for health departments to embark upon demonstration projects designed to develop methods of reaching these high-risk groups and of effectively persuading them to undertake such reductions. Here the official health agency may be in a position to offer the practicing physician certain services which he would like to have available for his patients, but which he would not normally request unless there were positive indications of disease. For example, the health department might offer to determine cholesterol levels upon request by the physician. If the level were above a certain agreed-upon value, say 260 mg. per 100 cc. of blood serum, the department might also offer to provide dietary advice to the patient if the physician so desired. Or the physician might prefer that he receive information concerning an appropriate diet so that he himself could advise his patient.

Chronic respiratory disease is another example of an area where research is needed on ways to develop an effective public health program. The identification of chronic respiratory disease as a growing public health menace grew out of another responsibility of the official health agency—that of maintaining the vital records of the community. The increasing toll of chronic respiratory disease became evident from analysis of mortality statistics.

Developing an effective control program for chronic respiratory disease requires a somewhat different approach than that used for coronary disease. As yet, sufficient information is not available to delineate the high-risk group as clearly as is possible for coronary disease. Many organizations, however, are trying to improve the knowledge in this area. Studies in the New York City Department of Health have shown that, in a population of several thousand transit workers, perhaps a proportion as high as 10 percent have chronic bronchitis as defined by the American Thoracic Association. The health department is now engaged in followup studies to determine the prognostic significance of the presence of certain symptoms and the findings of various tests of pulmonary function.

The time may not be far off when more effective means will be found for singling out the group at high risk of chronic respiratory disease. When that point is reached, public health agencies will face the same need as with coronary disease—the necessity of developing an effective public health program based on the accumulated knowledge.

Cancer of the cervix, in contrast to coronary disease and chronic respiratory disease, is a condition for which an effective technique, the Papanicolaou smear, is available for detecting early cases. The assumption is that if cases of cervical cancer are found early, the prognosis can be influenced. It is therefore unfortunate that public health agencies are not able to reach larger segments of the female population with this technique. A more effective means of reaching the population at risk with this procedure is an immediate need.

Too few health departments are giving time, thought, or attention to ways of developing adequate public health programs to help control these pressing problems. For certain other chronic diseases, however, there are no public health programs or few of them because there is not sufficient knowledge upon which to build, either in terms of casefinding techniques or in terms of therapy once the case is found. Among such conditions are arthritis, cerebrovascular disease and, of course, the ubiquitous common cold.

Health Department's Standard-Setting Role

The third class of research projects that an official health agency can best carry out are those which stem from its standard-setting function. Health departments have long engaged in this activity—setting standards for water and milk supplies, for immunization procedures, for care of premature infants and handicapped children, and so forth. This function may seem to be largely administrative, but it raises some rather fundamental questions about the natural history of disease, especially of the chronic diseases.

Control of the chronic diseases depends today in large part upon the availability of high-quality medical care. The advent of such legislation as titles XVIII and XIX of the Social Security Act points up the need for standards against which to measure quality. But standards, if they are to be realistic and accepted, must be based upon the fruits of solid research. As we learn more about the natural history of the chronic diseases, standards which today may be arbitrary will be replaced by those with a more rational underpinning.

Some time ago, Slee (6) supplied data on the length of stay in hospitals of patients with acute nonfatal coronary occlusions. These data suggested that there were two distinct classes of hospitals—those in which the length of stay averaged about 15 days and those in which the average was about 30. Assuming that the patient's disease is essentially at the same stage at admission, is it better for the patient to stay in the hospital 15 or 30 days? What happens to the patient after discharge? What is the prognosis? In other words, what is the end result in terms of the patient's health?

We need more studies on end results to serve as a basis for setting medical care standards. Until they are forthcoming, it will be difficult to assess the impact on the health of the population of different systems of providing medical care, such as fee for service and group practice, the system of affiliating the municipal hospitals in New York with teaching institutions, and the development of the concept of neighborhood health areas affiliated with hospitals and district health centers. Such assessment in time will determine how the community spends the health dollar.

The need for new measuring tools to aid in setting standards is well illustrated by the difficulty of evaluating the effectiveness of current programs for providing medical services to the elderly. More and more health departments apparently are developing programs directed at this group, for a large number of applications related to this subject have been received by the Division of Hospital and Medical Facilities of the Public Health Service. While, as mentioned, mortality and morbidity data continue to yield useful indicators of the health status of the population in general, more sensitive indices are needed among the elderly. When the average age of the population in a housing project such as the Queensbridge project in New York City is over 70 years, a health program may not have much impact upon mortality. One may also question whether it will have much impact upon the incidence of morbidity. Listing the disease conditions which will be found upon examination of any population 70 years of age and over is not difficult. They are heart and circulatory diseases, chronic respiratory disease, cancer, cerebrovascular conditions, and arthritis. These five conditions account for most of the disease which will be found. None of them, with the possible exception of certain forms of cancer. are reversible.

How then can the effectiveness of a program in such a population be measured? Nurses and physicians working in such programs report that one of the major areas for testing a program's effectiveness relates to the activities of daily living. For use in classifying populations, an efficient epidemiologic tool is badly needed which will combine estimates of the patient's medical and functional status. Many scales for measuring ability to perform the activities of daily living have appeared in the literature. Very few, however, lend themselves to classifying large populations. The measures have been designed for use mainly in clinical situations or in rehabilitation centers. What is needed is an equivalent of the International List of Disease, Injuries, and Causes of Death. A classification is required which could be widely agreed upon but which would retain sufficient flexibility to permit the incorporation of new knowledge. Various groups in the United States are trying to formulate such a classification, including the New York City Department of Health. The Public Health Service has also shown considerable interest in this activity.

Clearly, if the modern health department is to discharge its responsibilities in relation to chronic disease in the community, it must actively foster research along these lines, either through its own staff or in conjunction with the universities. I believe that a partnership of health departments and universities is more likely to yield fruitful results. Such a partnership could be effectively organized and executed along several lines, such as joint participation in specific research activities, interchange of faculty and health department personnel, and development by health departments of training programs for students and for faculty utilizing the environment of the operating health organization.

Definition of Disease Problem

The traditional role of the health department has been to define the nature and extent of the chronic disease problem in the community. Since the health department is legally charged with the responsibility of furthering the health of the population as a whole, the department can undertake communitywide surveys of one kind or another with relative ease. Moreover, it is in a better position than other agencies to translate the findings of such surveys into action programs. Perhaps with this thought in mind, a number of health departments have undertaken continuing household surveys, similar to the National Health Survey of the Public Health Service in general format, as a means of defining their own problems. A leader in such activity has been the Baltimore City Health Department. Its tradition in this area, which goes back almost to the early days of the Johns Hopkins School of Hygiene and Public Health, is reflected in the numerous surveys of the Eastern Health District of Baltimore. The Baltimore City Health Department under Dr. Matthew Tayback has engaged in a number of citywide surveys directed at a particular disease. Other health departments have also engaged in such surveys, including the California State Department of Public Health and the New York City Department of Health.

In addition to defining the magnitude of chronic disease problems, such surveys make available certain epidemiologic data which are becoming of increasing importance in the study of chronic disease. The most important of these data are the most basic of all, namely, estimates of the size and demographic characteristics of the population. In a people as mobile as ours, the decennial censuses can no longer measure, in an effective timespan, the changes which have

taken place in the distribution of the population-changes which have implications for the programs of the health department. Moreover, as people become more and more concentrated in urban areas, to deal with chronic disease as though the population were a homogeneous entity becomes extremely difficult. Efforts at control these days are being directed at the socalled neighborhood approach. We need, therefore, to have the facts about a neighborhood so that we can calibrate, on a neighborhood basis, the tools we have developed for measuring the effectiveness of the various approaches to chronic disease control. Baltimore's Eastern Health District offers a prime example of use of such a neighborhood approach. In New York City, the health department, after having surveyed the city as a whole for 2 successive years, has decided to make the neighborhood its survey unit. We would like to concentrate on the geographic areas where the need is greatest-to apply the principle of concentrating on the high-risk group. A major concern is to develop questions which relate to the program activities of the health department and then to feed back the answers to the program directors, so that, in the parlance of the systems engineers, the feedback loop is completed.

Conclusion

I have tried to convey my belief that prospects for chronic disease research in health departments are limited only by the imagination of the researchers. One major condition, however, must be met if these bright prospects are to be in any measure realized. A supply of welltrained, imaginative personnel is needed, who will recognize the intimate link between research and the active development of service programs designed to improve the health of the population. In the past when we were dealing with the acute infectious diseases, this relationship was more immediately evident than it is in regard to the chronic diseases. With the infectious diseases, the end results in terms of the effect on the patient became evident in a relatively short period. End results, however, rarely appear within a short period for the chronic diseases.

Nevertheless, it is still true that service pro-

grams must be based upon sound epidemiologic observation. This is why chronic disease research must be an integral part of a health department's activities.

Summary

Opportunities for chronic disease research by official health agencies are limited only by the imagination of the researchers. Because these agencies are legally responsible for protecting, maintaining, and improving the health of the population, they can undertake certain types of chronic disease research which would be difficult for other agencies to perform. Studies on narcotic addiction, mental health, and cancer and a referral program for selective service rejectees have offered health departments research opportunities.

Health departments bear a responsibility for translating the knowledge gained through research into public health programs, but too few of them are giving any time or thought to this responsibility. Service programs still need to be based upon sound epidemiologic observation.

Control of the chronic diseases depends upon the availability of high-quality medical care, and recent legislation, such as titles XVIII and XIX of the Social Security Act, re-emphasizes the standard-setting role of the official health agencies. To be accepted, standards must, in the final analysis, be based upon the fruits of research. More research into the natural history of disease is therefore needed.

A number of health departments have undertaken continuing household surveys, similar to those of the National Health Survey of the Public Health Service, to enable them to carry out their traditional role of defining the nature and extent of the chronic disease problem in their own areas.

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Computerized Hearing Tests

The development of a computerized hearing test, supported by the Public Health Service's National Center for Chronic Disease Control, is expected to solve one of hearing specialists' greatest problems—determining the hearing ability of very young children.

The test, now under development, will be particularly suited for use with the very young and the recalcitrant because it will not require an overt subject response to the auditory stimulus. Rather, it will permit hearing evaluation to be made from analysis of recorded brain waves.

Past research has shown that an instrument that records brain waves, the electroencephalograph (EEG), also records electrical activity stimulated in the brain by external sound picked up by electrodes attached to the scalp.

The test uses an EEG linked to a "summing computer." The computer is a necessary part of the test equipment because an EEG's electrodes pick up all electrical activity in the brain, not just auditory activity. The summing computer averages out everything but the auditory activity, which it allows to come through and be printed out in wave form. In a Neurological and Sensory Disease Control Program-supported study already underway, the University of Colorado Medical Center is establishing guidelines for reading these waves, so that accurate determinations of hearing acuity can be made in the clinical situation.

In conventional hearing tests a patient's hearing threshold—the point at which he can just detect sound—has been reached when he no longer responds to the auditory stimulus. In the computerized test, however, threshold may be determined for each patient by analysis of the brain waves that filter through the summing computer.

Researchers at the Colorado Medical Center, over the next 3 years, will evaluate the hearing of approximately 450 newborn infants and children under 5 years of age, by both computerized and conventional methods. When the study is completed, the analytical standards it sets will enable an audiologist or otolaryngologist to read an infant's brain waves and make a definitive diagnosis of hearing loss.