EPIDEMIOLOGY AND THE GENERAL PRACTITIONER*

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THE changes in the social and economic structure of the community that have occurred during the past 60 or 80 years have had a fundamental effect on existing attitudes in epidemiology. The causes of these changes are many, and relate both to man as an organism and the environment in which he lives. The communicable diseases present an excellent index of this change, primarily because they have been longer recorded and are better understood; but the figure gives some indication of the changes that have taken place with relation to mass disease. In this period since 1900 some mass diseases have much less significance than formerly, while others have risen from a lowly position to rank as leading causes of death, defect and disability, the three means by which the effect of mass disease are measured. Now non-infectious disease and mass injury as they become better appreciated as problems of communities add to understanding of the holistic pattern that characterizes all mass disease. The principles of epidemiology, established in the study of acute infections, are found applicable to these new problems, providing always that appropriate modifications in methodology are introduced.

A definition of epidemiology

Epidemiology may be defined as the study of all factors and their interrelationships that affect the course of health and disease in a community.

Now the uses of the epidemiological method have broadened; they are no longer confined to a search for the sources of infections in explanation of infectious disease. The administrator uses epidemiology to determine the necessary provisions for hospital care in communities. The method is the established procedure of evaluation in programmes of prevention and control of diseases of

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many kinds. Yet another application is in the design of experimental field studies, usually in search of further evidence to support hypotheses of causation. Epidemiology, therefore, is not merely an instrument for the study of disease, but the principal medium through which the scientific method is applied to the practice of preventive medicine.

The pattern of study

The communicable and other diseases of specific aetiology are regarded as resulting from the interaction of a triad—a host, an agent of disease, and the environment in which they both live. The host contributes to causation first through inherent characteristics which may be anatomical, physiological, or genetic, and related to age, sex and other attributes. Acquired characteristics are also commonly manifest, sometimes as the specific immunity that follows infection, and sometimes as metabolic and anatomical changes that originate in other morbid processes which range from mental disorder to injuries.

Agents of disease include substances of physical, chemical and biological nature. Disturbances may be caused by their presence, as in lead poisoning; and sometimes by a deficiency, as in scurvy.

Environment as a feature of causality may be analysed practically by division into three main groups, the physical environment, the biological environment, and the social environment; the social environment involves these features which arise from man's association with his fellow man. The physical surroundings of man are so evident an influence that for long the idea has presented that this is the whole of the environment. The biological component, however, may be stated to include the universe of living things that surrounds man, all else than man himself and that small group of micro-organisms arbitrarily separated as infectious agents. The epidemiological influences of the biological environment in respect of mass disease of man are in two principal directions. The first is the role of plants and animals as reservoirs of infectious agents, and the second that of arthropods as vectors of disease. The social component of environment is that which relates to the association of man with his fellow man. Since economic life so largely influences social existence, that also is included, together with the environmental influences that enter by reason of the customs, beliefs, traditions and attainments of people. Epidemiological factors within this division of environment range from housing to food supply, and from education to the provision of medical care.

Disease is no independent force, but one of the manifestations of the total reaction between man and his environment. A disease entity does not result from a simple contest between a host and an

agent of disease. A variety of environmental factors enter into its origin. When groups of a selected host are at risk, these considerations of disease in the individual have even more weight and environment becomes still more complicated. To recognize disease as the resultant of dynamic forces within a living system comprising an agent of disease, a host, and an environment does, however, help considerably in clarifying the concept of disease. Causation rests in all three elements in a varying degree, often with one or other feature dominant but by no means the same one regularly. In relation to mass disease cause is concerned with the forces that both create and maintain a situation and so with the origin and course that disease takes in population groups.

Today, to an increasing extent, preventive medicine is concerned with the control and prevention of mass disease for which no specific aetiological agent or mechanism is known. If causation is of multiple origin, no blind end is faced for the reason that the inciting agent remains undetermined or is indeed non-existent. Much of causations, particularly useful in control and prevention, may be found in factors resident in host and environment. These features of causation are to be recognized by epidemiological methods, and it is with such diseases that the current usefulness of the epidemiological method lies.

The epidemiological method

To emphasize field observations as the basic technical method of epidemiology is not to discount the importance of other sources of information; but the collection of field data is, nevertheless, the functioning part of applied epidemiology, an activity that is as much an art as a science. Four types of field study, long recognized in communicable disease practice, also characterize field investigation as applied to the wider groups of community disease problems.

The field investigation of epidemics is emergency epidemiology. It has to do with acutely developing situations in which each event must be associated and correlated with all others of the universe involved. The occurrence of epidemics, in the sense of uncommon events affecting appreciable populations, are not limited only to the infectious fevers; they occur with accidents, mental disease, coronary artery disease, and lung cancer.

The field survey seeks to determine the frequency of a disease at a specified time or of a total disease in an entire population. This is a cross-section study and determines prevalence. It is the common method used in the assessment of the health of a community under usual conditions.

The field review is a long-term study, usually more comprehensive than the field survey. Its epidemiological objective is to describe

a trend rather than prevalence, and as such is primarily a study of incidence.

The simplest form of field activity is the case study of the affected individual and his immediate environment, with the family as the unit of investigation. Usually, this is concerned with inquiry into the circumstances of a single event; and commonly it extends to other persons recently associated with the family and to occupational and other constituent groups in which the family has a part. In contrast to short-term studies of a single event, family observations are commonly longitudinal and long-continued.

The general practitioner and epidemiological research

As family doctor, the general practitioner has the opportunity to engage in the case-study type of epidemiological research; and such longitudinal studies of family health conditions and of the unobstructed use of medical care are of great potential significance. Apart altogether from the possibility of adding to our very meagre knowledge of the incidence and prevalence of many troublesome conditions, not hitherto reported, it is important to see what, if any, relationship exists between the illnesses of family members that spring neither from transmissible nor hereditary diseases but are due to other factors of mental and physical environment which may become more visible when the illness experience of a number of families is systematically examined over a period of years.

This longitudinal aspect of the health and sickness experience of a group of people observed over a period of time can be approached from at least two directions. First, the happenings of the group, as a group, may be recorded from year to year and the changes noted in the *group's* pattern of experience, irrespective of the sequence of changes experienced by any one person or family. Second, the movement of persons and families from one category of health or disease to another over the years may be the objective towards which the analyses are focused. Both approaches have their uses, but the second approach is more penetrating and more valuable.

There are also important longitudinal aspects to demand for medical care. How is the demand distributed among families of various types in a given year and how over a period of years? Is there a fairly random distribution among all families, or is there a hard core of families who year after year have substantially large needs? If there is such a core, what diseases and conditions create this demand? What kinds of families, in terms of age of parents and of children, of economic level, of number of children, are associated with high and low demand for medical services of various types—preventive care, maternity and gynaecological services,

treatment of minor illnesses, care for serious conditions?

Family study

Basic research problems. Once pertinent and significant research objectives have been formulated, there remains the task of aligning the data to answer the specific questions. Any comparison of health experience in large numbers of families from year to year requires some type of standard and descriptive classification of that experience. Clearly the family's experience derives from the experience of its members; so what is required is some means of characterizing each person's health experience for a year. Other family studies, in particular the Health Insurance Plan of Greater New York, measured this experience by combining several items of experience—total utilization of general-practitioner services, days in hospital and episodes of illness. It was found that sheer volume of medical services reflected other conditions so directly as to make it as definitive an index as would the use of the several kinds of factors. With a random sample of families or a matched sample of families from the panel population the data will cover persons who both come under medical observation frequently and who require medical attention at infrequent intervals.

Having characterized the various individuals with regard to their health experience, it then becomes necessary to devise a classification of families in respect of size, composition and inclusion of persons who are heavy, medium or light users. By this means it becomes possible to determine how constant over a period of years the respective factors are for each of the members and for the family as a whole. Distinctions will require to be made between utilization for illness and for maternity and preventive service, including paediatric care. These are not simple statistical analyses, but they can be made and are of great importance to the understanding of and the planning for a family medical care service.

In the management of the data a single statistical summary would be made on every individual in the survey: date of birth, sex, family status, address, including the dates of all notable items and of all the reported utilization data. In this way, it is possible to relate the date of birth to each year's experience of each person; for adults this may not be of primary significance, but for children, adolescents, and for the elderly, the exact age contemporaneous with the experience is necessary for proper presentation of material.

With regard to diagnosis, care must be taken to code the reported material intelligently and then to attach to each diagnosis the number of services rendered in connection with it. An important point arises here; the data on diagnoses will ramify through all kinds and degrees of illness and injury, obstetrical and paediatric

care, preventive services such as health examinations and immunizations, and will include such subjects of remedial services as birthmarks, malformations and a wide variety of physical defects, obesity, sterility, postural defects. This means that the conventional concept of illness and of illnesses to be counted as units must be carefully reviewed. Because of this widened range in the nature and seriousness of the conditions for which care is given, comparisons between the experience of different groups of persons and between the same groups from year to year, cannot be handled as if sickness is defined as manifest disease. There is no precise definition of sickness so both incidence and prevalence must be assessed in terms of specific diagnosis with allowance made for the factors of heightened awareness and attention to minor conditions which characterize different population groups.

Longitudinal studies also present other problems. There is a somewhat predictable cycle of health underlying the unpredictable occurrence of disease. Within a five-year period, for example, babies grow up, girls enter the childbearing period, women enter or complete the menopause, boys pass through the hazardous period of accidents, young men reach the peak of health and vigour, the degenerative diseases begin to appear in the middle-aged and for their control require medical vigilance, older men enter the period of urological difficulties, and both old men and old women reach their terminal illnesses. Some statistical skill is required to dissect the *expected* from the unpredictable needs for medical services of persons and families.

A pattern of study. A first step would be the setting up of a sample of households or families which would be a cross-section of the practice population, taking into consideration, residence, economic status and occupation.

The necessary questionnaires would include:

(1) A *family record-card* which would give detailed information on the household: this would be in two parts:

(*a*) Household data—giving the name and address of the occupier, together with the names of all the members of the household and the employment of each at the start of the survey, and brought up to date annually; and

(*b*) environmental data—giving information on type of house, number of rooms, condition of the living accommodation, the home accessories such as electrical appliances, the method of heating of the household, the water supply, sanitary appliances, and so on.

(2) *Individual record-cards* giving information on new illnesses, continuous sickness or recurring illnesses, days sick in bed and whether in hospital or home, days away from work, physician's services received, nursing services received.

(3) *Sickness record calendar* for the use of the head of the household, to keep a record of all illnesses and days away from work or school due to sickness, whether reported to the general practitioner or not.

This pattern of analysis will provide for tabulations into four classifications of sickness data: (*a*) non-disabling illness, (*b*) disabling illness, (*c*) hospitalized illness, and (*d*) illness under family medicine. These tabulations may be compared by size of family, family economic status, and housing.

The family study will provide some information on such important areas as:

(1) Disease conditions or disorders which appear to be concentrated in families.

(2) Patterns of illness in families with particular reference to chronic or long-term illnesses.

(3) The general factors of a biological and social nature which influence the incidence of disease conditions and disorders.

Some general aspects. The family is an appropriate area of research because it constitutes a universal, easily identifiable and functionally-organized unit. It is the foundation unit for social adjustments to life situations and is foremost in its influence on the socialization of individuals. Indeed, in functional units the next step from the 'whole person' is the 'whole family'.

Until fairly recently in the history of man, the problems of disease and death have been faced primarily in the family circle in a setting of kith and kin and with a combination of long-established face-to-face relationships. The problems of adaptation to illness involved primarily a change in roles and functions for the patient and his relatives within the familiar environmental setting. The family was recognized as the functional social unit that dealt first-hand with disease as an integrated part of its total responsibilities.

At the present time, illness treated in the home exhibits a close and interlocked set of relationships which overlap in roles and responsibilities. The culture of sickness at home fits neatly into the family context; but the patient experiences a sharp change when he is moved from home to hospital. At home the patient was properly regarded as the sickest member of the family circle and so deserving special attention and consideration. In hospital, the patient is one of many, and some are more ill than he.

The modern cleavage between home and hospital in our culture of illness and the relationships of the family group to the hospital is a problem in itself that deserves serious research attention.

The peculiar quality of a study of a population of families over a period of years is that it affords the opportunity to obtain information that is dynamic. The growth and decline of the family as a biological unit can be described. In the field of population, growth is depicted by the number of children born in relation to the date of marriage and the age of husband and wife. However, the size of

the family is dynamic for reasons other than growth. It is subject to depletions over a period of time by death of members, and also to dissolution by divorce or separation from the family of one spouse. The family can also be described as an economic unit and since changes in this respect provide fairly objective data, it is possible to note them over a period of time.

Summary

The longitudinal observation of a group of families affords unique possibilities in the study of chronic diseases. Illnesses of a chronic nature have low incidence, i.e. recognition of newly-diagnosed cases, in comparison with their prevalence at any given time. Therefore, if prevalence is not considered, incidence of new cases alone will not reveal the true state of the population with respect to the presence of chronic disease in it.

The incidence, or the attack rate of chronic disease, is of particular interest to many in the field of health. Observation of cases from the time of first recognition or first diagnosis enables more accurate study of the course of the disease in time and of the effect of such illness upon the family than is possible from retrospective histories.

Cases prevalent in the population at a given time cannot be used for this type of study since they represent survivors only. Close observation of a population over a one-year period is not a sufficient time for gauging accurately disease and conditions which develop slowly and occur at a relatively low rate.

NUFFIELD TRAVELLING FELLOWSHIPS FOR GENERAL PRACTITIONERS OF THE UNITED KINGDOM

As part of its programme for the advancement of health, the Nuffield Foundation, in co-operation with the College of General Practitioners, is prepared, in 1967, to award to men and women of the United Kingdom:

Three fellowships (each for a period of six consecutive months) to enable general medical practitioners of outstanding ability, preferably between the ages of 35 and 45, to undertake approved study overseas in July-December, 1968, in some subject of importance to general practice. The value of the fellowship award will cover for the fellow (and his wife) tourist return travel by air and other fares at tourist rates, together with an adequate subsistence allowance, and provision for the cost of employing an approved assistant during his absence.

Applications for these awards must be received by the Nuffield Foundation not later than *15 October 1967*. The conditions of the fellowships and application forms may be obtained from **the Director, the Nuffield Foundation, Nuffield Lodge, Regent's Park, London, N.W.1.**