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Nutritional surveillance in Europe

What is nutritional surveillance?

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Surveillance as a process for assessing the nation's health has become steadily more sophisticated as the emphasis has moved from considering only mortality rates to analysing key risk factors and morbidity trends. The data being collected are complex and massive with the variety of sources presenting problems in collation; this needs to be rapid to allow early and effective responses. Nutritional surveillance is now changing in the UK from a concentration on child growth to the use of new measures for assessing chronic diseases. The continued collection of classic information on mortality trends and their linking to additional data, e.g. on fetal and infantile growth, remains important for developing major new hypotheses on the relationship between diet and health. The UK has an opportunity, with its newly developing nutritional surveillance scheme, of forming a focus for a new and integrated European scheme which could prove invaluable in the decades to come.

The unsuspecting nutritionist may be forgiven for viewing the issue of surveillance as boring since it conjures up images of endless analyses of routinely collected statistics emanating from agencies with little interest in the intricacies of diet, metabolism or the molecular complexities which so delight the nutritional scientist. But we continue to be surprised by the value of surveillance in revealing gaps in our understanding. For example, our latest interest in nutrient–gene interaction comes from this field (the idea that changes in nutrition *in utero* or during the first few months of life may lead to the selective growth of specific clones of cells or to permanently imprinted changes in gene expression which thereby alter morbidity in middle age); these fascinating hypotheses stem from surveillance. Infant mortality rates are being linked to birth and placental weights and to insulin resistance in early adult life. An individual's susceptibility to obesity, hypertension and mortality from heart disease in middle age is also now being associated with early nutrition (Barker *et al.* 1990). Thus, fascinating new aspects of science as well as issues of immense significance in public policy emerge from the general surveillance field.

DEFINITIONS

What constitutes nutritional surveillance is still debated, but the concern for the distinction between surveillance and monitoring seems to have been over-emphasized. 'Surveillance' was introduced into English from French at the time of the Napoleonic wars and signified the need to keep a close watch over an individual or group of individuals in order to detect any subversive tendencies. The sinister overtones persist in everyday English but the term soon became associated with the epidemiological analysis of preventable diseases. Surveillance involves the routine collection and collation of data which inform Government about the nature and causes of disease. The term 'monitoring' is confined to the use of indices to evaluate the effectiveness of an intervention programme or a health care system. Thus, as Eylenbosch & Noah (1988) emphasize in their excellent book on *Surveillance in Health and Disease*, produced for the European Community, the measurement of urban air and blood lead levels before and after the introduction of Pb-free petrol requires the techniques of surveillance in the collection and assessment of data, but the total process is one of monitoring. Monitoring also implies the constant re-adjustment of performance in relation to results, and is an important management tool which can also be concerned, for example, with quality control. A 'survey', on the other hand, is a single study undertaken at one time. Surveillance could incorporate a series of surveys suitably adapted to make one comparable with another. Surveillance is also different from 'screening' which, although repeated, serves to identify individuals at risk and in need of special attention. The data obtained from these screening exercises could, however, be incorporated into a surveillance system.

Distinctions also need to be made between passive, active and sentinel disease surveillance. In the passive mode, the Government waits for the doctor or other professional to report information; this sometimes being required by law. Despite the legal requirements, information of this type may be slow to emerge and considerable under-reporting can occur.

In active surveillance, steps are taken to monitor the whole process of medical response, e.g. when early attempts are made to organize the isolation and identification of typhoid contacts. In nutritional terms, however, the recent adult surveys of diet and health conducted by the British Department of Health and Ministry of Agriculture can be considered as a component of an active surveillance system.

Sentinel surveillance, targets samples of, for example, primary health care centres to obtain rapid information on specific issues. Thus, selected child-health clinics can be used for child growth studies in different geographical areas. Sentinel surveys were first introduced in England in 1968 and have now been more widely used as a selective means of rapidly evaluating specific issues.

A history of the development of surveillance is well set by Eylenbosch & Noah (1988) and spans concepts enunciated by Hippocrates to the census systems of the Romans to Sydenham's introduction of disease classification in the mid-17th century. Graunt in Britain, Colbert in France and Von Leibnitz in Germany all contributed in the 17th century to analytical methodology with Achenwall introducing the term 'statistics' in 1749. By the end of the 18th century, Frank, in Germany, was linking analytical work on disease to the need for the legal enforcement of health policy as part of a health care and welfare system, so the political importance of surveillance also has a long tradition.

The last century of effort has seen the regular establishment of new schemes of surveillance. In 1893 the international list of causes of death was agreed. By 1899, Britain introduced the compulsory notification of infectious diseases, followed in 1911 by the use of surveillance data from the National Health Insurance Scheme. In 1935, the US introduced the National Health Survey and in 1943, the Danish Cancer Registry was begun. Thus, our current systems have a long and involved history, although too often we take a parochial view of developments linked to our own country's needs.

THE BREADTH OF NUTRITIONAL SURVEILLANCE

Clearly, in European terms, we have to consider the data required to assess nutritionally related diseases. Traditionally these diseases were conditions of deficiency, but prewar concepts also included general indices such as infant mortality, birth weight, child growth and maternal anaemia. To these we now have to add a whole range of conditions of adult life which have a nutritional basis or where diet is an important facet of the disease. Proposals will emerge from subsequent contributors for what should be done but the classic measures are still of value.

MORTALITY

The routine collections of data on age-specific death rates and the causes of death remain one of the most universal surveillance tools. The World Health Organization established an International Classification of Diseases which is necessary if we are to learn from the experience of cross-cultural studies. The International Classification of Diseases has developed progressively with revisions about every decade. The huge demands made on the system mean that a welter of new refinements have been developed in an attempt to satisfy policy-makers, statisticians, insurance organizations, health managers, clinicians and research workers of all kinds (Lamberts & Schade, 1988). It is easier to collect death rates accurately, however, than to specify the causes on a systematic and uniform basis in each country in the European region. Differences in medical tradition may prove to be important and has been repeatedly discussed in relation, for example, to the unusually low death rates from coronary heart disease in France. Even if these issues of certification are solved, the use of mortality statistics can prove to be a very insensitive means of evaluating changing conditions. For example, although the interval between the onset of disease and death is short, as in lung cancers, death rates may not appear to be very responsive to changing conditions, e.g. the removal of asbestos, if the lag in developing a mesothelioma is long. Conversely, when treatment is being monitored, then despite the prolonged interval between the onset of disease and death, e.g. in breast cancer, mortality rates are one of the few objective measures which can be used. Evaluating the effects of dietary changes on the development of breast cancer may, however, be very difficult.

PERINATAL MORTALITY AND MORBIDITY

Despite the drawbacks of mortality data, we can recognize significant features of societal and health care by scrutinizing such simple measures as perinatal or infant mortality rates. Perinatal mortality is the death rate at birth (including stillborns) plus those deaths

in the first week of life expressed per thousand births. The UK now lags behind many other countries in the quality of its maternal and paediatric care and in the provision of appropriate living conditions and health education for mothers and their babies. No single feature can explain the differences and secular changes in perinatal mortality on a European basis, so some caution is needed in drawing conclusions. Improved health in pregnant women, the introduction of legal abortion, the decrease in births to very young and very old mothers and the introduction of preventive policies in obstetric and health service practice may all have contributed to the decline in perinatal mortality. This measure is, therefore, crude so since the Second World War European countries have paid increasing attention to the surveillance of perinatal morbidity (Verbrugge & Wohlert, 1988).

Perinatal morbidity stems from chromosomal and congenital abnormalities, neonatal disease and a variety of other causes, as well as from the preterm delivery of small babies and the full-term delivery of babies afflicted by growth retardation *in utero*, i.e. 'small for dates'. Spontaneous preterm birth, i.e. birth more than 21 d before term, is the most prevalent risk factor for perinatal morbidity, varying by European countries from 4% to 6–7%. Primiparity, bleeding in pregnancy, frequent uterine contractions and a previous preterm delivery are all risk factors, but nutritional issues again stand out, e.g. the importance of periconceptual folate deficiency in determining the rate of neural tube defects and the deleterious effects of maternal underweight and physical work during pregnancy. Leave from work during pregnancy is considered a crucial preventive measure, but the provision of maternity leave varies widely in Europe.

Babies who are underweight as distinct from premature have been affected by other nutritional factors. Not only is low maternal weight at the start of pregnancy important, but low weight gain during pregnancy and tobacco smoking are well-recognized hazards. Smoking may exert its effects through the nicotine-related vasoconstrictor effects on uterine blood flow, but smoking also tends to reduce food intake and induces unnecessary maternal fuel combustion by both increasing the basal metabolic rate and by directly inducing thermogenesis while smoking (Dallosso & James, 1984). Smoking also induces free radical damage to maternal membranes (Duthie *et al.* 1989) as well as inducing an excess catabolism of vitamin C. So there are many factors which may limit the inflow of nutrients to the fetus of the smoking mother.

The analyses of the factors affecting crude perinatal mortality rates are good examples of the importance of combining surveillance data with more specific analyses. For nutritional surveillance to be an effective tool of policy-making there may be a need to extend the analysis of information on specific topics. Thus, there is a need to scrutinize maternal smoking rates and maternal weight gain as well as placental and birth weight rather than simply relying on perinatal mortality rates. The Nordic countries introduced a more specific national surveillance method for perinatal morbidity in 1979; Britain, having started the study of perinatal morbidity with Butler and Alberman's (1969) perinatal cohort study, now seems to be lagging behind. In France, perinatal surveillance is based on representative samples of births in the nation as a whole rather than in selected regions. The living conditions of the women are included as well as details of the course of pregnancy and the mother's obstetric history. The data are evaluated in terms of prevention strategies and the need for improving maternal and neonatal care.

MORBIDITY

Morbidity surveillance is more important than mortality data if our purpose is to relieve suffering rather than simply extend life (Doll, 1974). Many diseases, such as arthritis, also cause great disability but have little impact on mortality rates. Young people saved by heroic measures as babies may go throughout life with severe handicaps. Thus, a decline in perinatal mortality may indicate the provision of better care, but without information on the outcome for those survivors of intensive early care we may well, on a societal basis, have increased rather than decreased the medical problems to be tackled.

Data on morbidity are not so readily collected but a classic source of information in the UK is the Hospital In-Patient Enquiry System in England and Wales. This system is widely applied in other European countries. Hospital medical records are an obvious source of information and these can be used locally and nationally. The ability to extract data in a simple and rapid manner is more limited than it should be in most European countries, despite the introduction of computers. Recommendations of the European Community now exist for the minimum basic data-set needed for recording hospital morbidity. These are available in the standardized format on hospital discharges which are routinely collated, particularly in Britain where there is such political interest in waiting lists and hospital bed turnover rates. Usually only the nature of the patient's condition and the length of hospital stay are recorded. Nevertheless, with the huge burden of diet-related conditions involved in medical practice in Europe, nutritionists probably pay too little attention to these data.

Where disease is not often sufficiently severe to warrant hospital admission, then in many countries, such as Belgium, the Netherlands and the UK, there are mechanisms for monitoring disease patterns in the primary health care sector. General practitioners collect comprehensive data on morbidity, but official notification systems are often incomplete and special studies have to be undertaken to estimate the degree of under-reporting: responses can vary from 50% of the true picture to 1%! New emphasis on the chronic, rather than the infectious, diseases is now apparent and the new contract for doctors in Britain suddenly focuses on obesity, hypertension and hypercholesterolaemia, as well as other measures requiring screening. On this basis, the data emanating from general practice are likely to become much more reliable. The widespread use of computers in primary health care will also facilitate data collection, but as yet we have little evidence that nutritional issues are a management focus for analysis.

THE NUTRITIONAL COMPONENT TO GENERAL SURVEILLANCE

It is easy to propose that new systems should be developed to enhance our ability to look at nutritional issues, but it seems clear that the current surveillance process could be used to extract the relevant information in a better way.

In deciding on nutritional surveillance, it is important to be clear about what is needed and why. Too often those who advocate the collection of massive amounts of data, refuse to contemplate how the information is to be used and to recognize the importance of having the data analysed rapidly. For example, it is no use allocating large resources to monitoring the diet and growth of schoolchildren if the data take an inordinate amount of time to collect and, when collected, lead to no action if evidence emerges of

deteriorating conditions. That money would be better spent on simpler indices which provide an effective basis for action. The issue is essentially, therefore, one of how best to ensure that a surveillance system is sufficiently flexible to provide a basis for health strategies and then for evaluating preventive measures. It is now widely accepted (Lamberts & Schade, 1988) that the quantity of information available from surveillance systems is overwhelming, but that the quality of the information and the structures of surveillance inhibit the use of this information in practice.

The classic approach to nutritional surveillance involves the evaluation of national food production, regional patterns of household expenditure on food, household studies of food purchases and consumption at home and in the work place or, occasionally, studies of individual consumption. These studies are usually the province of Ministries of Agriculture and contribute to the Food and Agriculture Organization's data on national food balance sheets. The Statistical Office of the European Community is compiling harmonized information on all its constituent nations but relies particularly on data on expenditure from household budget surveys. The UK seems to be the only European country with a dedicated annual household food survey. Although this survey is of great interest to nutritionists, the main users of the information appear to be the food industry which is now required to buy the detailed information. The surveys are, therefore, essentially part of a dietary surveillance system and by not incorporating or linking with health issues, cannot be considered a primary component of nutritional surveillance. Now, with the introduction of an adult UK survey which links diet with indices of health such as weight, blood pressure, serum cholesterol and anaemia, there is an opportunity to develop a coherent strategy which could become the forerunner of a new European system.

With proposals from the European Community that health become one of its concerns, it is clearly important to attempt to establish a coordinated approach to nutritional surveillance which can allow a more effective evaluation of the dietary contributors to disease. Much surveillance work has been ignored by nutritionists, but now we need a more focused approach concentrating on those diseases of affluence and those determinants which take such a heavy toll on society.

CONCLUSIONS

Only a few examples of surveillance have been given to illustrate the continuing importance of routine data collection for UK and European policy-making and health care. A coherent system of surveillance which allows the accurate monitoring of mortality rates is important first as a reassurance for Governments seeking to assess improvements in health care. It is still surprising how often such crude measures as age-specific mortality rates for a disease can be used to develop hypotheses to analyse the effects of social change and the importance of nutritional factors. By linking these data with other measures of diet, behaviour, growth or body composition we are also increasingly able to discriminate the basis for ill-health. Further refinements in surveillance are in train with indices of morbidity and risk factors for disease becoming of ever greater importance. With computer-based collection, collation and analysis we should, in the future, be in a far better position to evaluate the basis for changes in European health. It remains to be seen, however, whether the information can be processed sufficiently rapidly for us to return to the old concept of surveillance. The rapid

availability of data and its proper scrutiny followed by governmental action may yet emerge as European Governments seek to improve the health and welfare at a time of extraordinary societal change.

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