



CLINICAL APPLICATIONS OF EPIDEMIOLOGY

The contribution of epidemiology to the study and promotion of the health of populations is clear and time-honoured. Now other aspects of health care, including clinical practice, are calling for the application of quantitative problem-solving skills that are classically part of epidemiology. To demonstrate the benefits and consequences of new and existing therapies, many of which aim only to make marginal improvements in the treatment of chronic diseases, requires the assembly and analysis of data from large numbers of patients. To assess the utility of new diagnostic procedures, comparisons of their sensitivity, specificity, positive and negative predictive values — as well as their cost — are essential if they are to be employed to best effect in clinical practice, and these comparisons are essentially epidemiological.

As the technical basis of diagnosis and treatment becomes more sophisticated, and computers enable the collection and manipulation of large data sets with an ease that was only dreamt of two or three decades ago, the skills that have been employed in population-based epidemiology increasingly overlap with those that may reasonably be expected of the proficient clinician. This has led, especially in north America, to the growth of two new disciplines — clinical decision making and clinical epidemiology.

The first of these reflects a major contribution of mathematical and statistical science to clinical practice in which mathematical models are used to support therapeutic choice making. The second discipline — clinical epidemiology — has grown substantially in north America as a result of an increasing awareness of the need to study large groups of clinical patients in order to amass enough data to detect subtle differences in outcome among disparate groups. Clinical epidemiologists are rarely afforded the luxury of controlled experimental designs. Their subjects may be at varying stages in the natural histories of their illnesses and may be receiving a mix of treatment strategies.

In clinical epidemiology standard epidemiological concepts such as the importance of observer variation, the impact of bias, the influence of the prevalence of a condition on the performance of a diagnostic test, the critical importance of an accurate description of disease natural history, and concepts of risk, all find their place.

Concern with value-for-money in health care has increased in parallel with the cost of new technologies. But cost of health care represents only one side of the equation. Health outcomes are on the other side. Growing interest in the assessment of the outcomes of all forms of health care, from health promotion through to palliation, has been a further stimulus to the application of quantitative skills to the clinical setting. The construction of measures of outcome that include quality as well as duration of life has been led by health economists, although in some settings epidemiologists and clinicians have collaborated in these developments. One well known example is Walter Spitzer's pioneering quality-of-life index which is useful

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Clinical applications of epidemiology

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in assessing different modalities of treatment for patients terminally ill with cancer. Spitzer, now at McGill University in Quebec, is editor of the *Journal of Clinical Epidemiology*.

Epidemiological skills have also been applied recently in another clinically-related area — pharmacoepidemiology. For example, controversy about the use of fenoterol and other beta agonists in the management of asthma has depended to a large extent on case-control studies for data. While the picture is still incomplete, the studies support a more cautious approach to the use of beta agonists in asthma management. As therapy will presumably now move in the direction of a long-term usage of topical bronchial corticosteroids, we may presume that pharmacoepidemiological techniques will be applied to monitor the consequences — positive and negative — of this change in therapy.

In Australia the most visible presence of clinical epidemiology is at the University of Newcastle, where the Centre for Clinical Epidemiology and Biostatistics has been firmly established over the past 10 years. Richard Heller, Annette Dobson, Michael Hensley, David Henry, David

Christie and others have made a major contribution to the training of clinicians, especially from the Asian and Pacific region, in the principles of both clinical epidemiology and biostatistics. In other places small groups of clinical epidemiologists, or clinicians with an epidemiological interest, are making contributions as well, and the discipline is growing. At the University of Sydney, Les Irwig, Robert Cumming and Paul Glasziou have recently introduced an ambitious, but well-received, strand of clinical epidemiology into years three and six of the undergraduate medical education program. Consideration is being given to ways in which formal postgraduate training in clinical epidemiology could develop at the University of Sydney.

It may be time for the Epidemiology and Health Services Evaluation Branch of the NSW Health Department to consider ways in which it can strengthen clinical epidemiological capabilities in the State. Having firmly established a system of infectious and environmental disease monitoring through the network of Public Health Units, the next step may be to consider where else epidemiological skills can make a contribution to the health-care system.

The Health Services Evaluation Section of the Branch is evaluating a variety of topics related to health services and their outcomes. In 1991 the Section completed descriptive epidemiologic analyses of surgical procedures. Topics included coronary artery bypass surgery as an example of the use of new technologies, a range of general surgical procedures in adults, and ENT and appendectomy in children. The Section also analysed patterns of some diagnostic procedures, including gastrointestinal endoscopy and antenatal screening programs, and is working with representatives of clinical colleges (surgeons and anaesthetists) to assist them in their evaluation of outcomes of services.

With increasing emphasis in management in the NSW Health Department on health outcomes, and a growing capability to appraise economically aspects of health care through the affiliated Centre for Health Economics Research and Evaluation at Westmead Hospital, such a development would be welcome. The secondment of trainees to units actively applying clinical epidemiological methods in clinical practice, such as at Sydney's Royal North Shore Hospital, would be a good first step. Another worthwhile strategy would be consideration, during the design of statutory, administrative and financial health-care data collection systems, of the potential for adding clinical epidemiological "value" through data base linkage and other mechanisms.

These are exciting days in the development of epidemiology. Clinical application of epidemiological skills offers great scope for increasing our rational control and wise use of clinical care resources. It's time, in NSW, for us to put our epidemiology where our patients, as well as our populations, are.

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PUBLIC HEALTH OFFICERS — TRAINING UPDATE

The 15 Public Health Officers (PHOs) training in public health practice in NSW are involved in a wide range of activities, projects and plans at Public Health Units or the Health Department's Epidemiology and Health Services Evaluation Branch. A 16th PHO is at the Epidemiological Intelligence Service of the Centers for Disease Control in the US.

Training activities include monthly sessions such as:

- A 'bug breakfast' — a tutorial on an infectious disease presented by a PHO. Recent topics have included typhoid fever, rabies and malaria.
- A biostatistics/epidemiology seminar (for example, on the use of the Health Department's Inpatients Statistics Collection).
- A seminar on a topic from environmental health, chronic diseases, maternal and child health or health services (for example, on the principles of environmental health risk assessment and risk management).

At the first of a series of quarterly project review sessions, four PHOs gave presentations on their projects. These included a study of the health effects of the Newcastle earthquake, implementation of infectious diseases aspects of the new Public Health Act, preparation of an injury prevention strategy for NSW and a review of the medical screening program for refugees.

The trainee PHOs attend a writing skills course, and there are plans for an epidemiology update and short courses on selected management topics, as well as a scientific conference in March for the presentation of research and project results.

Mark D Bek, Public Health Officer.