

The Field Epidemiology Training Program: responding to the challenge of current and emerging infections

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Introduction

In 1987, the inaugural meeting of the Australian Epidemiological Association described Australia's disease control activities as "fragmented, inadequate and poorly coordinated", and in need of reform.¹ In 1991, Australia implemented a range of strategies to enhance the surveillance and control of infectious diseases. Central to these strategies was the inception of the Field Epidemiology Training Program (FETP) at the National Centre for Epidemiology and Population Health (NCEPH), Australian National University, Canberra. Over the last six years, the program has graduated 37 trainees, and is now collaborating with a global initiative to consolidate, extend and promote this type of field training in public health.²

The latter initiative was started in 1997 when the World Health Organisation's (WHO) Division of Emerging and other Communicable Diseases issued a challenge to FETP-like programs in countries around the world (Table 1). The challenge was for the programs to form a collaborative network, and a partnership with WHO for responding to the threat of current, emerging and re-emerging infections globally. The result was an inaugural meeting of representatives of country programs (Table 1) in June 1997, and the formation of the Training Programs in Epidemiology and Public Health Interventions Network (TEPHINET). This new partnership will pool training resources and experiences, and assist countries

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seeking to extend or establish training programs in public health. Staff and trainees of member programs will also participate in WHO's rapid responses to disease outbreaks globally.

This paper outlines the goals and educational objectives of the Field Epidemiology Training Program, its relevance for responding to current and emerging infections, and the backgrounds and subsequent careers of Australian trainees. It draws on the Australian experiences to extrapolate potential benefits of basing an FETP-like program within the Pacific region.

FETP: an innovative model for training in public health

The conventional model for graduate training in public health is based on coursework in university classrooms over a one or two year period, and may or may not incorporate fieldwork. The courses have traditionally been conducted in a developed country, and the outcome for the student is the Master of Public Health (MPH) qualification.

The training program in field epidemiology is an alternative model for training in public health where the actual health department's work environment and the community become the trainee's classroom; this concept has prompted the more apt label of Public Health Schools Without Walls. These programs have all been modelled on the highly successful Epidemic Intelligence Service (EIS) introduced through the Centers for Disease Control in the USA in 1951.³ The program has since been adapted to meet the public health training needs in many countries around the world (see Table 1).

The two year FETP was adapted in Australia to foster the professional development of field-trained epidemiologists. The graduates would be competent in the practical application of epidemiological methods to a wide range of contemporary public health problems in Australia, and in particular, to the surveillance and control of infectious diseases. The program was developed in close collaboration with the heads

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Table 1. Training programs in field epidemiology currently represented in TEPHINET *

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| Epidemic Intelligence Service (EIS): USA |
| Field Epidemiology Training Programs (FETP): Australia, Canada, Colombia, Egypt, Indonesia, Mexico, Peru, Philippines, Saudi Arabia, Spain, Taiwan, and Thailand |
| Public Health Schools Without Walls (PHSWOWS): Ghana, Uganda, Vietnam and Zimbabwe |
| European Program for Interventional Epidemiology Training (EPIET): The European Union |
| Epidemiologie et Gestion des Programmes de Sante (EPIGEPS): Francophone African countries |
| * TEPHINET: Global Network for Training Programs in Epidemiology and Public Health Interventions |

of the communicable disease units in the States and Territories and at the National level, to ensure relevance to their program needs. Trainees have usually been based in these units around the country.

While contributing directly to public health activities, trainees complete and document the challenges and the tasks to a specified academic standard (see below), and are awarded the Master of Applied Epidemiology (MAE) qualification. In Australia, the MAE is considered to have similar, but more practical value than the MPH.

The FETP and public health surveillance

An important purpose of the FETPs is to nurture practical skills in managing and directing all aspects of public health surveillance. Every country needs the capacity to analyse continuously the health status of its population to understand its problems, and to identify and respond to them in a timely and effective manner. Surveillance is the means for attaining this capacity. The primacy of surveillance is under-valued and under-utilised in many countries. It may be perceived as the system for reporting data (numbers in tables, figures and graphs) to a range of agencies, including international and other organisations who use them as markers for assessing the health status in the country, or as performance indicators of health care delivery. But surveillance can offer much more to the country's own decision-making processes.

Surveillance is defined as the ongoing and systematic collection, analysis and interpretation of data.⁴ The data may be on diseases, injuries or other related events. It may also include information on health related behaviours, both personal and environmental, and on the utilisation of health services. But reporting the data is not where the process of surveillance ends. What may be easily overlooked, is the need to synthesise and translate the data into information that addresses health needs in the population and triggers public health responses and decisions on health programs and policies.

It is this skill in transforming surveillance and other epidemiological data into 'information for action' that is central to the educational objectives of the program.

Objectives and structure of the FETP

The major goal of the program is to train health professionals in the practical applications of epidemiological methods to public health. They learn to use surveillance and other epidemiological methods to identify, define and respond to health problems of the population in a timely and effective manner, and then to evaluate the responses. These goals are equally relevant for addressing emerging and re-emerging infectious diseases.

Trainees start the course in, and return to Canberra at six monthly intervals for two to four week intensive periods of lectures, seminars and workshops. Each trainee has a local supervisor (or preceptor), usually head of the trainee's work unit, and an academic supervisor based at NCEPH. This type of 'learning-by-doing' or 'shoe-leather' epidemiology is based on real problems as they are encountered in the course of day-to-day activities.

The educational objectives are competency-based, and trainees complete the following tasks over the two year period:

- analyse and interpret surveillance data;
- design, implement and evaluate a surveillance system;
- design and conduct an outbreak or other urgent investigation, and recommend measures to control and prevent recurrences;
- design and conduct an epidemiological study such as a community survey, a cohort or case control study, or an evaluation of a public health intervention;
- use data from a surveillance system, an outbreak investigation or other epidemiological study to evaluate or formulate health programs or policies;
- critically appraise scientific papers from peer-reviewed journals, and assess their scientific validity and relevance to public health practice in the local setting;
- demonstrate oral and written communication skills by presenting findings of a study to the community and health professionals. For example, presentations at meetings and scientific conferences, and written reports for the media health news bulletins, and peer-reviewed journals.

Table 2. Reports of emerging or re-emerging infections in Australia in which Australian trainees played a leading role

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| First outbreak caused by a hitherto unknown virus named the bat paramyxovirus (initially, labelled the equine morbillivirus) |
| First outbreak of haemolytic uraemic syndrome (caused by <i>E. coli</i> 0111) |
| First outbreak of polyarthritis caused by the Barmah Forest virus (an alphavirus transmitted by <i>Culex annulirostris</i> mosquito) during the wet season in the tropical north, and a longitudinal morbidity study of subjects infected with the same virus on the east coast |
| First community-wide outbreak of psittacosis |
| Retrospective studies of subjects dying of encephalitis of unknown aetiology, to identify possible bat lyssavirus infections (first detected in bats and also first human case in Australia in 1996) |
| The large outbreak of melioidosis during an unusually heavy rainy season in the tropical north |
| Autochthonous cases with melioidosis in an area not known to be endemic for the disease |
| Study of the possible role of migratory birds in the first outbreak of Japanese B encephalitis in Australia |
| Proposal for the surveillance of birds, animals and humans to detect the introduction of Japanese B encephalitis in the receptive northern region of Australia |
| Unusual timing of influenza outbreaks in the tropical north compared with other parts of the country |
| Newly emerging pattern of meningococcal disease caused by the virulent ET15 strain of <i>Neisseria meningitidis</i> C:2a:P1.5,2 |
| A cluster of fatal infections caused by <i>Haemophilus influenzae</i> type b in a nursing home for the elderly. |

Unique to this program, and critical for assessing and responding to emerging infections, are the skills that students develop in 'field epidemiology'.⁵ These are defined as the application of epidemiology to an unexpected problem, and may require an immediate response for which the epidemiologist must travel to solve the problem in the field, with an investigation which in turn is likely to be limited because of the need for timely intervention.

This differs from planned epidemiological studies in three respects:

- the field investigation often does not start off with a clear hypothesis but first requires descriptive studies to generate a hypothesis which then has to be proven;
- there is an immediate need to protect the community and to address its concerns; and
- there is the need to consider when data are sufficient to take actions rather than to delay them, while exploring additional research questions that might be answered by the data.

At the end of the two year program, the trainee submits, and has an oral examination based on the bound volume which contains a scientific record of the public health activities. In this manner, the trainee is expected to demonstrate mastery of the applications of epidemiology, and the capability for independent activity, responsibility and professionalism in the field.

Learning styles

The learning process in the FETP exemplifies four critical approaches for graduate training in public health:

- Learner-centred education: the emphasis is on active acquisition of information and skills by the trainee who is eventually expected to take full responsibility for learning.
- Problem-based education: the learning opportunity is triggered and stimulated by an actual problem encountered at work.
- Locally-relevant education: the focus of training is on the health of the population in which the trainee will work, or in one that is closely similar to it.
- Community-based education: learning occurs through activities within the community's diverse facilities, including health centres.

Australian trainees and graduates

By 1997, a total of 52 students enrolled in the program, including three medical graduates from New Zealand, and one from the All India Institute of Medical Sciences in Delhi, India. Of these, 57% were females and the median age of entry was 34 years (range 28-49 years). Medical graduates (including specialist physicians and paediatricians) and nurses accounted for 60% and 13% of all trainees respectively. Other trainees included veterinarians, microbiologists, and environmental health officers. At the time of enrolment, twelve trainees already had graduate qualifications in public health (Graduate Diploma or Master in Public Health) and eight had a Doctorate in Philosophy.

Just over 80% of the graduates now work in public health positions in local, state, national, and international settings. Others have enrolled in PhD studies or taken up academic posts in epidemiology. Nineteen of the 22 medical graduates who completed the program have enrolled for, or have

completed further training as Public Health Specialists with the Australasian Faculty of Public Health Medicine.

In the course of their work, trainees have contributed to the investigation of emerging or re-emerging infections in Australia shown in Table 2.

While the program has focussed mainly on communicable diseases, other activities have covered perinatal and infant mortality, fertility and pregnancy outcomes, nutrition policies, surveillance for injuries, trends in the epidemiology of lung cancer, an 'outbreak' of insulin dependent diabetes mellitus probably related to Coxsackie virus infections, smoking among school children, evaluation of dental surveys, health care attendances during an international sports competition, surveillance of domestic violence, hospital-based epidemiology, and data linkage in health information systems.

The program is flexible enough to be adapted to related training needs. A cohort of new students completed the two year MAE program based on evaluations in general practice. In 1998, a further modification of the program will be offered to Aboriginal people at NCEPH to address contemporary needs in indigenous health.

Potential benefits from an FETP-like program in the Pacific

The FETP is not intended to be a ready-made recipe to fulfil all national or regional needs in public health training. Rather, it provides a training framework and philosophy that is flexible and can be made responsive to the health needs and the health workforce needs unique to a particular setting or country. The wide spectrum of health workers eligible for training, the styles of learning, the potential training localities, and the population focus in the FETP are all key elements considered essential in the Pacific.⁶⁻⁸ They have been addressed in the Yanuca Declaration of 1995, in the principles for post-graduate training identified in Yanuca in December 1995,^{9,10} and at the Community Health in Medical Education conferences in the Pacific.¹¹

The FETP curriculum is designed to reflect the health needs of the community, and the resources and constraints prevailing within a community. The study projects are usually identified by the health unit itself. They are designed and conducted by the trainee in close collaboration with workers from a wide range of disciplines, from community and health care providers in health centres and hospitals, to policy makers and senior advisers. The work units and trainees also mobilise and help commit the skills and direct participation of the academic supervisors and their regional and global support networks to local, national and regional public health activities. Furthermore, trainees and supervisors from different countries in the Region will interact regularly on individual learning experiences and projects, thus extending public

health networks and other benefits beyond individual countries and into the Region.

Such benefits are already apparent in TEPHINET, the new global initiative of public health training programs. The formation and mission of this network means that the Pacific Region will have a powerful ally in establishing such a program, and in drawing on its strength and resources from around the globe.

Conclusion

Conventional public health training programs aim usually to engender personal and professional development of the trainee. In addition to this goal, the FETP model was designed to contribute immediately and directly to public health activities from the workplace, and to capacity building in the country. This model of 'learning-by-doing' has been adapted to meet the public health training needs of many developing and developed countries around the world. It can be adapted readily as the indigenous public health training program for the Pacific.

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