

POSTGRADUATE TRAINING IN GEOGRAPHIC OCCUPATIONAL HEALTH IN AUSTRALIA

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ABSTRACT

Because of Australia's isolation, its often harsh environment, and its relation to its Asian and Pacific neighbours and to Antarctica, the teaching of the School of Public Health and Tropical Medicine in the University of Sydney, the sole such institution in Australia, has always attempted an international and geographic approach. The School, founded in 1930, had until 1977 offered only purely medical postgraduate diplomas in public health, tropical medicine and occupational health. In 1978 the School started a Master of Public Health program of one academic year's course work followed by a short thesis, open to graduates in any health-related field. The course comprises about 40% core subjects and 60% electives in main disciplinary areas.

The Department of Occupational and Environmental Health in the School is providing in 1978 an elective in occupational health, and within a year or two more specialised options in occupational hygiene and ergonomics and safety. The programs are basic to further accredited training towards specialism in occupational health, whether for a career in industry, government, community health, teaching or research. Teaching in geographic occupational health is integrated into core and elective teaching. The Department has a climatic chamber and occupational hygiene and environmental biology laboratories and can draw on the Epidemiology, Statistics, Microbiology, Parasitology, Nutrition, Biochemical and Entomology sections of the School. In 1977 the Department conducted its first annual 3-month full-time course in occupational hygiene, a subject which is dealt with effectively in few places in the South East Asia and Western Pacific Regions. The School thus offers comprehensive postgraduate training in geographic occupational health and hygiene, and is interested to explore opportunities for collaboration in teaching and the development of programs in the area.

Any account of teaching of geographic occupational health in a region must consider regional geography because the teaching has to satisfy local and general needs. If geography is the science describing the earth's surface, form, physical features, natural and political divisions, climates, productions, etc. (Shorter Oxford English Dictionary), consideration of regional geography must extend beyond the physical to include also the socio-economic and industrial background of the country.

Australia's recent history as a colony (until 1900) ensured a very largely British culture, thus British standards of medicine and public health, and strongly developed secondary industry. The Anglo-Saxon population predominance has yielded greatly since World War II to influx of mainly European migrants and thus to a much more cosmopolitan mix, with corresponding complexity in health status. Generations behind, Australia has followed the pattern of European settlement of America, yet in a land the size of the United States it has a population about one thirteenth of that country. Despite its large primary industry, about 80% of its 15 million people live in the widely scattered capital cities of the seven states and the federal capital territory. The federal system has generated seven different sets of laws relating to occupational health and safety but no national laws. Australia's position between 10° and 42° south latitude dictates a climatic range from hot to cold, which with its dryness (three quarters desert or semi-desert) and part mountainous terrain often confers harshness and hazard, particularly in the conduct of the many mining operations in great isolation. Finally, in its position in the globe Australia relates both to the extremes of its Antarctic stations, and to the developing nations to its tropic north and in Oceania.

SCHOOL OF PUBLIC HEALTH AND TROPICAL MEDICINE

Postgraduate training in geographic occupational health in Australia is in effect confined to that provided by the School of Public Health and Tropical Medicine in the University of Sydney. The School was formed in 1930 from the Department of Preventive Medicine in the University of Sydney and the Australian Institute of Tropical Medicine in North Queensland (founded in 1909). In its twin origins since 1930 it has offered courses for the diplomas in public health (first in 1910) and in tropical medicine and hygiene (1926). The School's Occupational Health Section (now Department of Occupational and Environmental Health) contributed teaching to these diploma courses since its formation in 1949, but its own one-academic year diploma course did not start till 1974.

Being a unit of and totally funded by the Australian Department of Health, and having national consultative functions in addition to its postgraduate teaching and research roles, the School has always constituted in effect a national institute of health. Renaming as such was one of the recommendations of a Committee of Review on the School in 1975¹. Other recommendations included master of public health programs for medical and non-medical graduates (started in 1978), including a major elective in occupational health. In 1977 an annual 13-week full-time course in occupational hygiene was initiated by the School's Department of Occupational and Environmental Health.

The Department is equipped to deal with geographic occupational health in its teaching and research, with its occupational hygiene laboratory, climatic chamber, cell biology laboratory and occupational epidemiology group. It draws also on the other sections of the School in such areas as statistics, entomology, parasitology, bacteriology, biochemistry and nutrition.

The School has always taken in students from Africa, Asia and Oceania to its postgraduate medical diploma courses. In 1974 and 1975 on behalf of the World Health Organization it conducted six-week courses in occupational health for physicians and hygienists from the Western Pacific Region, which constituted courses in comparative, international, geographic occupational health in all but name. The courses were preceded by a study of teaching needs of the Region².

The School's Department of Occupational and Environmental Health arose out of the marriage in 1975 of the School's occupational and environmental health units. No one working in this field has any doubt about the wide scope of occupational health as being concerned with bystander and consumer as well as operator, as indeed constituting public, community, environmental, rural and personal health in relation to work. But environmental health means different things to different people^{8,18}. To many it is a mixture of sanitation (now often thrown over by public health in its present preoccupation with health services), environmental pollution and occupational health. In the School, environmental health has meant largely study of the effects of the thermal environment, hot and cold, particularly on survival, adaptation, toxicology, ill health and work, because of the import of the subject to Australia.

GEOGRAPHIC OCCUPATIONAL HEALTH

The World Health Organization's definition of environmental health as the study of the effect of the physical and social environment on the health and safety of individuals and communities can be read as a definition of geographic health, of which geographic occupational health is a special case. If geographic occupational health is the study of the effects of geographic differences on occupational health, the School in its teaching of the subject has immediate concern with the gross difference between tropic ("developing") and temperate (mostly "developed") countries in community and occupational health status. The effects of occupational hazards in the former countries are often compounded by effects of climate, poor nutrition, poor hygiene, poor vector control and overpopulation, whereas the community hazards of the latter are those of man's own making. The old triad of host, parasite and environment has given place to that of host, technological agent and environment. The disparity between occupational health in the tropics and temperate zones is then the grossest division of geographic occupational health, a study which after all arose in part from a Sub-Committee (of the Permanent Commission) for Occupational Health Problems of Developing Countries, and in part from observed variation in results of geographically dispersed investigations¹⁵.

The study of geographic occupational health formalises what can be readily recognised in perusal of any of the proceedings of triennial congresses of both the Permanent Commission and of groups such as the Asian Association on Occupational Health, and can be traced in the history of medicine and occupational medicine and in the occupational health literature of different countries. Such perusal indicates also that observed geographic health differences

attributable to work arise from different materials, different methods developed in isolation, different levels of technology and different degrees of adaptation of industry to imported technology; which are often hard to distinguish from, indeed interact with, those attributable to physical, biological, cultural, social and economic features of the different regions.

POSTGRADUATE TEACHING OF GEOGRAPHIC OCCUPATIONAL HEALTH

In its postgraduate teaching the School does not set out to introduce geographic occupational health as a separate subject. Rather, it emphasises geographic differences throughout the curriculum as a means of teaching environmental effects on occupational pathology, pathogenesis and epidemiology; of teaching principles of recognition, evaluation and control of environmental hazards; and of teaching the varied systems of occupational health organization and services needed. Ideally, the teaching of geographic and epidemiological concepts and methods relating to occupational health, in effect another definition of geographic occupational health, should inculcate in students the ability to predict regional occupational pathology in their planning of appropriate industrialisation in developing countries and in virgin areas¹⁶, both of which are issues of concern to Australia. An indication of the teaching related to geographic occupational health in the School's postgraduate programs is given in the subjects proposed by the Department of Occupational and Environmental Health for the new Master of Public Health curriculum. Some items merit comment.

The critical importance of dose-time-place relationships in the evolution of occupational disease patterns is emphasised in teaching, including recognition of the constantly changing picture within and between places with its implications for prediction and control; the time scale of chronic occupational (and non-occupational) disease with the lag often of decades before recognition and the consequent difficulty of setting safe levels of exposure; and the out of stepness between places in exposure and thus in disease. Studies of geographic occupational differences in coronary heart disease and hypertension⁵, in carcinogenesis⁹ and in occupational lung disease⁶ provide examples.

Social determination of geographic differences in occupational disease demands teaching of the influence of personal income, economic development, education and culture no less than of nature of industry and of biological, physical and toxicological hazards. Australia for example tolerates habits of drinking, smoking and analgesic taking which confound geographic comparisons of occupational disease and injury patterns.

Differences need to be taught not only in geographic occupational disease patterns but also in premorbid changes, functional impairment and relative functional capacity. Research by the School is used to teach such lessons, for example into the differences between different populations doing similar work in the prevalence of risk factors of coronary heart disease; and in the distribution of a wide range of biological variables of potential significance for occurrence of

disease and identification of adaptation⁴. It is a matter of coming down Hatch's¹⁰ curve from the irreparable to the reparable and to compensatory responses to noxious environments, even to geographic differences in work performance, errors and fatigue.

In Australia there is particular need in teaching to emphasise the problems created by geography in extraction of natural resources. Massive exploitation of iron, asbestos, manganese, nickel, lead and uranium ores, oil and natural gas in harsh climates and in great isolation confers more health problems for the mining company than those of the processes themselves. The operations disturb local ecology, and affect local primitive cultures particularly if indigenes are recruited to the workforce. Their endemic disease deeply affects their working capacity⁷. Such operations call on resources of tropical, public and occupational health advice.

Students need to understand the inappropriateness of introducing modern machinery and poisons to countries unprepared by training, experience, equipment and organisation to handle safety procedures¹³.

In a country such as Australia, a third of whose population comprises migrants since World War II, teaching in preventive medicine must recognise also the special geographic occupational health problems represented by migration. Migrants bring with them the health patterns of their countries of origin (even if they are a non-random sample), patterns which tend to be partly maintained over at least one generation when racial groups retain their culture in their new environment. Other forms of migration no less worthy of recognition in geographic occupational health are the rural-urban, the cross-occupational, and the itinerant. Proportionate rural-urban population distributions are changing, drastically in some developing countries, where rapid industrialisation promotes social as well as occupational health problems. Migration aside, urban populations differ from rural populations, in many ways including geographic occupational health³.

Teaching of method

Geographic differences in occupational health demonstrate environmental effects and their magnitude, and are valuable sources of teaching method in occupational epidemiology, particularly the methodological pitfalls which confound conclusions of investigations. They illustrate to students the need for care in planning descriptive and analytic industrial and environmental surveys. Because distance constrains opportunity for direct study of geographic differences, particularly international, much use has to be made of literature sources in teaching. Problem-oriented study of research papers on particular topics from different regions provides a means of integrating teaching of method into teaching of subject areas. The advantages and shortcomings of data pooling from different regions can also be taught. Reliability of various sources of epidemiological data on geographic occupational pathology, and comparability of data from geographically different regions, are valuable means of studying method, whether one is teaching with sickness absence, work disease and injury,

premature retirement or mortality data. Particular emphasis is laid on the difficulty of accurately obtaining the numerator and denominator of rates, and of establishing the nature of illnesses responsible¹¹.

Use of geographic occupational health as a medium for teaching method goes beyond descriptive and analytic studies to include also the setting up of prevention trials and the evaluation of prevention programs¹⁴. Similarly it goes beyond study of geographic pathology to include also the political, social, economic and legal factors in cause and constraints in cure⁶. Geographic occupational health affords opportunity to teach also understanding of interaction of environmental and biological variables, and of the value of multivariate analysis in analysis of occupational factors in chronic disease. Geographic pathology is particularly valuable in teaching means of detection of occupational causes of cancer⁹ and relative contribution of environmental and occupational exposures in the causation of neoplasms, for example mesothelial tumours¹². Of particular value also is the use of geographic uniqueness of exposure to demonstrate resolution of questions of causation, the opportunity presenting in the case of the crocidolite miners in Western Australia being an example. Involvement of the School in occupational cancer (including mesothelioma) registers, which have a strong geographic component, affords readily available material for teaching method in occupational epidemiology.

Study of geographic differences in "normal" human variability of working populations, mental and physical, helps students understand principles underlying distributions of data, and their use in analysis of environmental effects, for example on work capacity, biochemical status and behavioural reactions related to work and general community influences.

Finally, geographic differences can be used in teaching assessment of risk, by evaluation of the precursors of health impairment, and by evaluation of exposure; understanding of dose-response relationships; survey design; thresholds; periodic health and environmental monitoring; criteria of test procedures; and the setting of standards²⁰. The area affords understanding to the student of the complementary collaborative roles of occupational physician and occupational hygienist, and of the supporting roles of pathologist, physiologist, biochemist, statistician, demographer, clinician, toxicologist and others, in interpretation of toxicological data for assessment of environmental effects.

The future

As mentioned the School has always trained postgraduate physicians from Africa, Asia and Oceania but in small numbers that can have had too little impact on the solution of their country's public and occupational health problems. Any school which must cover in its teaching the needs of diverse regions must, in a one-year curriculum, restrict its teaching to principles, methods and practice in the general field of geographic occupational health broadly suited to the region, which students can then adapt to the problems peculiar to their countries. Overseas students are asked to present their own countries' problems, but there will still be a call for special courses to meet local and particular needs.

Schools in industrialised countries face the criticism that their teaching is irrelevant to developing countries, which should therefore train their own occupational health professionals, with emphasis on public health, infection, clinical and tropical medicine, nutrition, family planning and rough occupational hygiene¹³. Certainly the School sees a need to teach the role (and integration) of occupational health in public health in its region with all its geographic differences, as recommended by the Inter-Regional Seminar on Training and Services in Occupational Health for Developing Countries¹⁷.

The School sees a particular place for teaching the teachers of its region, and for regionalising scarce teaching resources, as also recommended by the Seminar. In particular it presently affords one of the best opportunities in its region for teaching of occupational hygiene at postgraduate level, whether by short term courses or by masters programs. Several other regional moves in which the School has a place² include reciprocity and exchange lectureships between institutions in the region; individual postgraduate programs which traverse occupational, environmental and public health fields; interdisciplinary, problem-oriented teaching and self learning; and doctoral and specialist training for the few to fill high level academic professional and administrative posts.

Part of geographic occupational health is concerned with cure of problems and thus with provision of services and occupational health manpower needs. Teaching programs ideally should be planned not haphazardly but as an integral part of occupational health manpower development which includes undergraduate and subprofessional training¹⁹. Consideration needs to be given in parallel to priorities in health services planning, which necessarily involves research (and the training of occupational health workers for its undertaking), for example, into comparative occupational epidemiology at national and international levels, and into criteria for establishing priorities²⁰.

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