EPIDEMIOLOGY FOR THE PART-TIME OCCUPATIONAL PHYSICIAN

PART-TIME EPIDEMIOLOGY AND PART-TIME OCCUPATIONAL MEDICINE

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In one sense, to speak of part-time epidemiology is something like talking about part-time cardiac surgery. However, just as an internist or pediatrician needs to be aware of the relations between their observations and the possibilities of surgical intervention, so also should physicians generally appreciate the significance of certain observations in epidemiological terms. Epidemiology exists to assess the differential risk in the occurrence of illness between different groups. The risk differentials are then interpreted as due to differences in exposure or in susceptibility to the operation of those causes. Cause, in this context, has a much broader connotation than etiologic agent, for it includes the complex of circumstances that are involved in exposure and susceptibility, as well as the proximate inciting agent. This view necessarily entails consideration of the environment within which the events occur.

Every species evolved under environmental pressures which shaped and determined the characteristics of its members. Thus our present configurations and abilities are the result of thousands of generations of man-environment adjustment, in which the marvelous plasticity of the genetic machinery permitted that adjustment to be ever more finely tuned. A significant aspect of species adaptation is the promotion of individual adaptive mechanisms, so that each of us has the capability to adjust locally and temporarily to special environmental problems. We can, for example, on exposure to a hot climate adapt over a period of one to two weeks by markedly increasing our rate of sweating; or, we can adjust to a sudden physical exertion by a marked increase in cardiac output in a matter of seconds.

All organisms modify their environments, if only by their existence, but man has been most notable for his propensity to change the shape and character of the space around him. People have moved mountains, altered the course of rivers, created deserts, and moved plants and animals from one end of the earth to every other. When necessary, we have developed means to package small samples of a livable environment and exist in those packages in places where otherwise we could not hope to survive -- in extremes of

heat and cold, under the sea, and in space. The long term problem with massive environmental modification is whether we shall so change the environment within which we evolved that our adaptive mechanisms fail and we cannot adjust to the environment we created.

That disease frequencies differ from one place to another is an observation that has intrigued scientists for many hundreds of years, and has provided much valuable information for epidemiological study. Whenever a major geographic difference of this kind is found, the explanation must be either that the two populations differ in genetic constitution or that exposure to different environmental circumstances is responsible. The number of diseases directly attributable to an identified genetic defect is quite small, and therefore the great majority of geographic variations in the risk of disease must be directly determined by environmental differences. This conclusion is of the greatest significance for the future of preventive medicine, for it offers hope that these environmental factors can be understood and modified to reduce the occurrence of disease.

Man-environment interactions are a complex set of relations between human beings and other humans, other animals, vegetation, climate, and the physiographic characteristics of a place. In a general way, the environment of the community at large exerts significant influence on all of the persons residing there, and establishes overall patterns of environmental adaptation.

The environment to which we are most immediately exposed may be considered to consist of four components, the general community environment, our homes, our workplaces, and our recreational sites (Figure 1). We might think of them as transition states and an adequate environmental assessment should take account of the characteristics of each, time spent in each, and the transitions between them. A partial listing of some of the elements of these environmental compartments is given in Figure 2.

The physician in occupational medicine will focus his attention on the workplace, but he should maintain an awareness of the broader environmental complex. The place of employment clearly presents many special opportunities for exposure to conditions that lead to illness and disability, and the importance of recognizing their association is very evident, both for humanitarian reasons and also to maintain productivity. Places of employment are commonly artificial environments, subject to manipulation and control, within certain restraints of feasibility and cost.

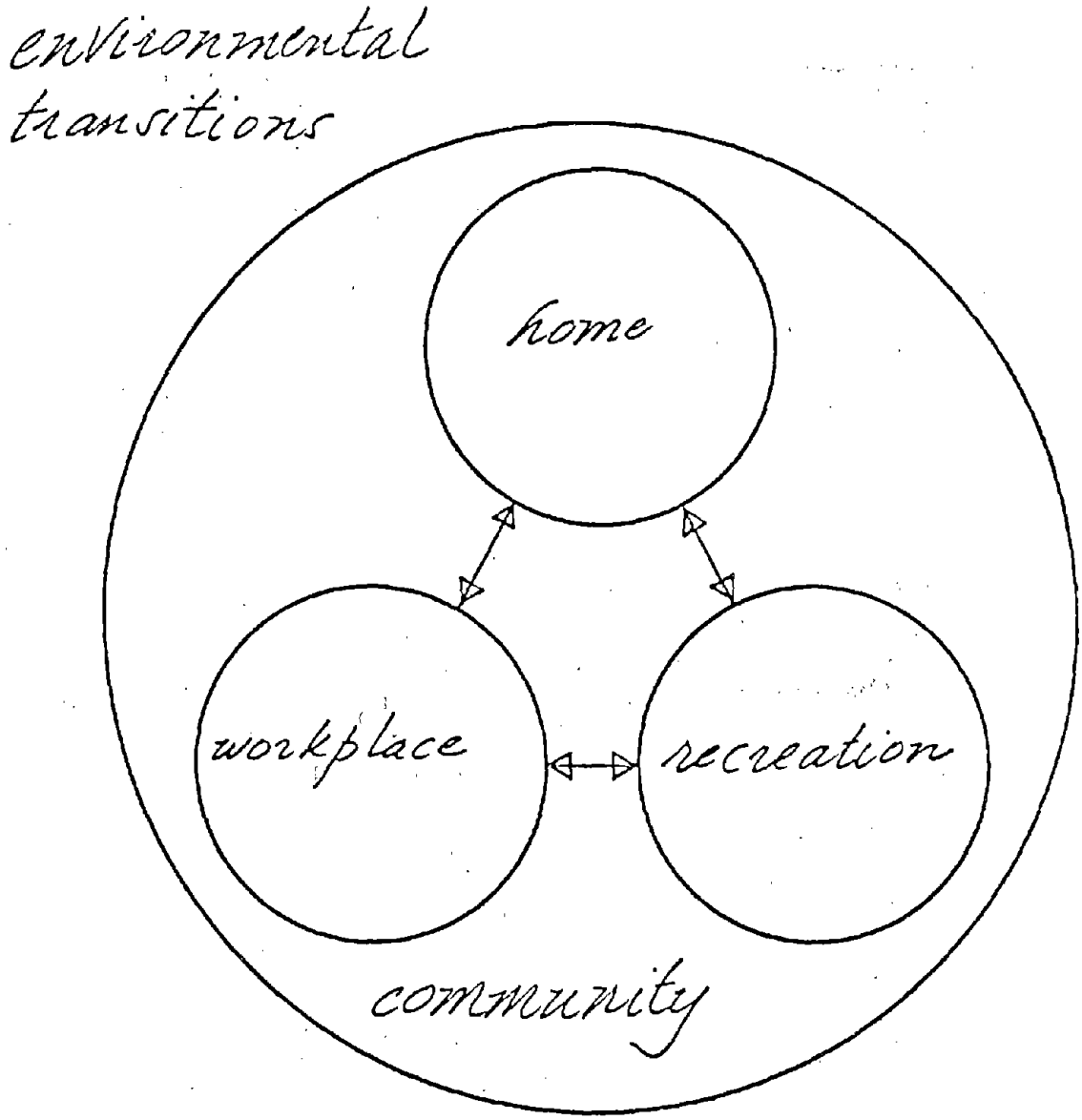
environmental
transitions
home
workplace
recreation
community

FIGURE 1

COMMUNITY ENVIRONMENT

- GEOLOGICAL STRUCTURE/TOPOGRAPHY/ALTITUDE
- TEMPERATURE/HUMIDITY/PRECIPITATION/SOLAR RADIATION
- AIR QUALITY AND COMPOSITION
- WATER AVAILABILITY, COMPOSITION, QUALITY
- TRANSPORTATION
- BUILDINGS
- VEGETATION
- ANIMAL
- POPULATION DENSITY AND DISTRIBUTION
- SOCIAL ORGANIZATION

HOME ENVIRONMENT

- SPACE ARRANGEMENT
- ENERGY USE
- CLIMATE CONTROL
- LIGHT, AIR, WATER, WASTE
- ANIMALS
- HOUSEHOLD DENSITY
- HOUSEHOLD ORGANIZATION

WORKPLACE ENVIRONMENT

- HAZARDS
  - TOXINS
  - MACHINERY
- PHYSICAL ACTIVITY
- HOURS OF WORK

RECREATIONAL ENVIRONMENTS

- SPECIAL HAZARDS

FIGURE 2

Two major ways exist to determine how these environments should be managed. The first is based on a priori perceptions of hazards. That a given procedure may be dangerous may be perfectly evident, and appropriate steps may be taken to eliminate or reduce the risks to employees.

The second approach depends upon monitoring the experience of people in the workplace. This is necessary when the hazard is occult or previously unrecognized. If an illness breaks out in high frequency, or if a few cases occur of a disease which is very uncommon, then the simplest monitoring systems are likely to signal the appearance of a problem. However, if the illnesses resulting from occupational hazards are very uncommon, or have a long latent period between exposure and clinical manifestations, then the surveillance mechanisms must be more sensitive. Additional complications arise when workers are spread over a number of sites and when they migrate from one company to another or from job to job.

In order to assess properly the associations between work and illness, we need to be able to compute specific incidence rates. That is, the records systems must not only record illness, but must maintain an account of persons exposed to potentially dangerous situations. This may be done through personnel records according to job classification, place of employment, industry, or similar relevant characteristics.

The Occupational Safety and Health Act established a legal requirement for the maintenance of records as needed "for developing information regarding the causes and prevention of occupational accidents and illness." These will include "accurate records of, and...periodic reports on, work-related deaths, injuries, and illnesses other than minor injuries requiring only first aid treatment...", and further, "accurate records of employee exposures to potentially toxic materials or harmful physical agents..." Despite our understandable reluctance to establish dossiers and linked record files on individuals, these procedures cannot be as useful as they should be unless the opportunity exists to merge experience across companies throughout an industry and to trace individuals as they move. Evidently such record systems are subject to abuse, but reasonable safeguards can be incorporated, and the current social climate provides strong protection against their use for other than proper purposes.

At the center of all of these concerns is the physician in occupational medicine, whether full-or part-time. Upon his shoulders rests the responsibility to observe the health and illness

experience of the work force, to assure that medical data are accurately recorded and maintained and to proffer advice on matters of health and safety. If he is to fulfill this responsiblity he should develop an awareness of epidemiological principles, an appreciation for the concept of differential risk across population groups, and an alertness to unusual events and aberrant circumstances that signal the need for special investigations and protective mechanisms.

OCCUPATIONAL HEALTH AND SAFETY SYMPOSIA

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