From Disasters to the Inner City Environment: Psychological Determinants of Physical Illness

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Epidemiologic research has made important contributions by investigating unusual or unexpected patterns of disease, like epidemics. The information gained from these investigations of unusual disease patterns has allowed us to prevent the future occurrence of such disease patterns. However, the primary concern of most epidemiologic research nowadays is not with the unusual patterns of disease but with the most common endemic priority problems. One approach for investigating such common problems is to focus on unusual situations in human populations where one may be able to learn from associations observed under a set of circumstances that are different from those where a majority of the cases occur. Examples of such approaches of successfully studying unusual situations to elucidate etiological relationships include migrant studies and studies of occupational groups with specific exposures. Figure 1 explores the relationship between the unusual occurrence of disease and the unusual exposure patterns. Epidemics may occur as a result of unusual exposure patterns (A) but these may also happen in a subgroup of the population that is susceptible for the disease even under regular exposure patterns (C). An unusual exposure pattern may also provide an opportunity to study diseases that are endemic and highly prevalent (B). Unusual situations in human populations sometimes provide the possibility of studying the effect of massive doses of exposure in these groups like in the population exposed to the atomic bomb in Hiroshima and Nagasaki. As illustrated in (A) these unusual situations may also be associated with unusual frequencies or patterns of outcomes.

This presentation will provide examples of research that were conducted in populations that were exposed to unusual situations and or lived in an unusual environment. These examples will focus primarily on the relationship of psychosocial stressors and mental and physical illness.

The effect of various psychosocial stressors on mental and physical illness is well documented by a number of clinical investigations and few population based epidemiological studies. There are a number of issues that epidemiologists have to deal with within the context of some of the complex relationships that exist between psychosocial stressors and mental and physical illness. Some of these issues are definitional and involve classification of outcomes, others deal with measurement. However, some of the most critical problems in conducting epidemiological research in this arena relate to the logistic and other difficulties of implementing such research in the field.

Our presentation of epidemiologic research done during the civil war in Lebanon and investigations following the 1988 earthquake in Armenia, illustrate the potential for learning about the role of massive environmental stressors on both physical and mental health from such research. Our current investigations from within the Epidemiologic Catchment Area Follow-up Study in Baltimore provides us an opportunity to test these relationships using a more systematic approach.

At the conclusion of this paper we will highlight the need for an integrated approach in epidemiologic research in such complex situations.

Figure 1.
PSYCHOPATHOLOGY IN DISASTER SITUATIONS

There is a rich literature of studies that have looked at the relationship of disasters to psychopathology. Whether it is following a hurricane, an earthquake or war, it is well established that as a result of a major disaster there is a high level of psychopathology in the exposed population3).

Psychopathology in wartime.

A number of studies have reported increased psychiatric illness in persons exposed to war stress. These reports include high rates of psychiatric disorders among concentration camp survivors following the Second World War4,5), in East European refugees6), and in Vietnamese evacuees7). Many of these studies have a clinical focus and few are population based.

While the protracted war in Lebanon was in progress, we have conducted a number of investigations that have assessed the role of stressors on illness in the population. During the siege of Beirut, in the summer of 1982, we conducted an Emergency Health Surveillance Project that was designed to provide ongoing information on the health status of Beirut residents and to quickly identify health problems requiring assistance and intervention8). As part of this project we conducted a population based household survey of about 1,345 families in Beirut and its suburbs. The analysis of data from this population survey revealed, that parallel to high rates of common infections, this population also reported high rates of psychological distress symptoms9). The frequency of these symptoms in this population was related to worsening physical health and loss of home and income. (Table 1)

In a separate study of children in schools and orphanages in Beirut, and using various psychological tests, it was observed that being disadvantaged in wartime, like in an orphanage, increased the probability of the child having psychological problems10).

Psychopathology following an earthquake.

Psychiatric morbidity, particularly post-traumatic stress disorders (PTSD) following disasters are a major public health problem. Estimates of PTSD following disasters vary between 2 and 60 percent11). Although measurement issues may explain some of the differences in these estimates, it is more probable that these could result from differences in the nature of the disaster and the sociocultural environment within which these disasters occur.

Following the earthquake of December 7, 1988, in Armenia, we embarked on a number of population based epidemiological studies of the determinants of death and injury during the earthquake as well as of the long term effects of the earthquake in a cohort of 33,000 survivors of the disaster. Within this population, a geographically stratified sample of 1,785 persons between the ages of 16 and 70 were interviewed using a special psychiatric questionnaire over a period of one year. Within two years following the earthquake, about 60 percent of this adult population had symptoms that could fulfill the diagnosis of either PTSD and or depression. The risk of PTSD and depression was related to the amount of loss in the individual's family. Thus, the intensity of the ensuing loss from the disaster was related to the intensity of the psychiatric morbidity in this population (H.Armenian et al. Manuscript in preparation ).

PHYSICAL ILLNESS AND STRESSORS

The role of psychosocial stressors in physical illness has been highlighted in a number of studies. The ongoing war in Lebanon, provided an opportunity to assess the impact of war stressors on coronary artery disease (CAD) within a case-control study at the American University of Beirut. A total of 127 patients who underwent coronary angiography were individually matched with visitor controls free from any evidence of clinical CAD. Arteriographic cases were compared to with two control groups: arteriographic controls with entirely normal coronaries, and visitor controls. Cases reported significantly higher number of exposures to acute war events compared to both control groups. Crossing the "green line " separating the two fighting factions in Beirut, considered as an attribute of war related chronic stress, was more frequent in cases compared to both control groups. Adjusting for the effect of well established CAD risk factors did not alter the above reported findings12).

PSYCHOPATHOLOGY AND PHYSICAL ILLNESS

Although there is a wealth of clinical reports in the literature about psychopathology following physical illness, most of these are based on cross sectional studies and very few of these are population based. The role of psychopathology itself as a determinant of physical illness has been difficult to study. A major problem for such studies is the difficulty in establishing antecedence of diagnostic specific psychopathology to physi-
The Baltimore Epidemiologic Catchment Area (ECA) Follow-up project is a population-based study of assessment of diagnostic specific psychopathology and other comorbidity in 1981, 1982, and 1993. From an original population-based cohort of 3481 persons who were interviewed in 1981 for psychopathology, chronic physical illness and disability, 1862 were alive and reinterviewed in 1993. In this study we were able to investigate psychiatric antecedents of a number of physical illnesses including arthritis, diabetes, migraine, and coronary heart disease (Figure 2).

A number of associations between antecedent psychopathology and these chronic illnesses have been demonstrated within the ECA study. In a recent analysis, the possible interaction between antecedent psychiatric illness and arthritis as determinants of incident disability was studied (H. Armenian et al. Submitted to publication.)

**CONCLUSIONS**

The review of these studies, in particular the ECA study, has highlighted that the relationships between psychosocial stressors, physical and mental illness are not simple. In order to understand these relationships one has to use more complex models of etiology. As we could study within the ECA study population, psychopathology could be a determinant of, as well as it could be caused by physical illness (Figure 3). If we consider the role of social and demographic characteristics, in addition to factors affecting access and utilization of health services within the framework of these relationships, the need for a more integrative approach to etiologic research has to be underscored (Figure 4). Such an approach is dependent on the use of more complex models of etiology, like the web of causation of MacMahon, and newer approaches of investigation and analysis.

One such approach that epidemiologists could learn from and could adapt to their needs, is systems analysis. Epidemiologists need to view disease and wellness within systems of interacting elements. Such systems have inputs, processes and outcomes, and are integrated within systems at higher levels. Also, outcomes in one system are inputs to other systems (Figure 5). The relationship of psychopathology and physical illness that was discussed here is a good example where such an approach could possibly be more productive than existing approaches.

Epidemiologists have primarily focused on simple models of etiology where the direction between one primary independent variable is studied as it affects one outcome. Multivariate analyses in such a context are used to hold constant or adjust for other determinants of this primary relationship of interest. The underlying philosophical model for such an approach to etiology is essentially univariate and simple. Progress in epidemiology is contingent on adapting our powerful computing

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**Baltimore ECA Followup**

1981 - 1996

3481 Respondents in 1981

- 2,637 Survivors
- 2,182 Located
- 1898 Interviewed in 1993 - 1996
  - 844 Died (24% of cohort)
  - 455 Not Located (17% of survivors)
  - 284 Refused (13% of located)

72% of Survivors

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**Figure 2.**

**Figure 3.**

**Figure 4.**

**Figure 5.**
and statistical tools to study more complex models of interacting factors within identifiable systems.

We need to study how the whole web of causation works rather than just how a thread or a knot is held within the web.

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