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CHANGING PARADIGMS OF INFECTIOUS DISEASES IN DEVELOPING COUNTRIES

New Paradigms of Infectious Diseases

Microbes and man have been engaged in a continuing battle for ascendancy on this planet. In India whatever successes had been achieved on the public health front were largely in the field of infectious diseases. Small-pox is an excellent example. To this will soon be added elimination of polio, guineaworm disease, tetanus in the newborn and leprosy. Despite these successes, the microbial front remains disturbing and is a cause of anxiety. Thirty new diseases have appeared on our planet in the past 20 years. Infectious diseases continue to be the leading cause of death. What diseases were thought to have been conquered or nearly-conquered, have now staged a comeback. Examples are plague, malaria and kala-azar. Diseases such as tuberculosis-thought to be controllable through available technologies and for which elaborate national plans of control were developed decades ago, still exist and are getting worse. What has proved to be a new and deadly disease of mankind throughout the world and despite its early recognition soon after its introduction into India in 1985-86, HIV infection in India is rising inexorably and there is a sense of despair. Diseases such as dengue and cholera which are endemic in India with periodic outbreaks from time to time, have now assumed more virulent characteristics. These examples represent a formidable array of emerging and re-emerging infectious diseases and a new paradigm of infectious diseases is now in evidence due to a multiplicity of factors. Recognition of these paradigms and the factors contributing to them is essential for developing effective control programmes. The increasing phenomenon of drug resistance is a part of the paradigm.

Amongst the factors influencing the new paradigms of infectious diseases, there is the age-old factor of poor living conditions which in many areas have worsened for certain sections of the community, often in spite of growing overall economic prosperity.

Other factors include the unintended effects on ecology, at both macro and micro levels, resulting from human activities under the overall rubric of "development". These developmental activities include:

(i) Dams and irrigation projects which are necessary and bring about prosperity may also tend to create ecological conditions, if not foreseen, conducive for re-emergence of old diseases, especially vector-borne diseases.

(ii) Industrialisation and energy-producing initiatives which are necessary for economic growth but also lead to environmental degradation with health consequences.

(iii) Changes in land use patterns and human encroachments of forest areas, a common phenomenon today, exposing human populations to infections with which they have had no previous encounter.

(iv) Unplanned urbanisation and excessive population growth creating optimal conditions for the entry and spread

of infectious diseases in congested squatter settlements. The essential problem here is the breakdown of infrastructure and services in slum areas creating conditions conducive to the resurgence of diseases once brought under control. Urban health is a matter of overwhelming urgency without much time left to correct the prevailing deficiencies and hazards.

(v) Growing trade, tourism and trucking accompanying increased international travel leading to greater intermingling of people today than ever before creating conditions for the spread of infectious diseases. The speed of transmission of infections increased enormously as mankind transited from sailing ships to jet planes.

The changes in climatic conditions now reveal significant health effects. Atmospheric pollution, deforestation and ozone depletion play a key role in global warming. This in turn, would lead to higher surface water evaporation rates with greater rainfall and heavier monsoons in key areas of the planet. This would alter everything from migration of birds, habitat ranges of insect vectors of disease and the availability of arable land for agriculture. Dengue and malaria transmitting vectors are sensitive to rainfall and ambient temperatures. As a result of global warming, malaria may spread further up the foothills of the Himalayas. The lesson of macro-ecology is that all life forms and chemical systems are closely linked in complex ways[1]. It would appear that current and anticipated changes in local and global ecologies would favour some microbes and their insect vectors.

In place of the Cold War there are now multiple local wars and conflicts which along with natural disasters, such as famines and floods, lead to mass movement of people internally within countries and across borders. The living conditions of the refugees provide a fertile ground for infectious diseases.

Changes in human lifestyles and behaviour including sexual behaviour and food habits are another potent factor in the changing paradigms of infectious diseases. Lastly, the continuing inadequacy in the quality and outreach of health services is an important factor compounding the situation.

The challenges presented by the New Paradigms of Infectious Diseases can be conveyed by the following four diseases.

Dengue

Dengue, by the 14th of October 1996, had caused 126 reported deaths and 2,545 cases of presumed dengue fever complex admitted to public hospitals giving a mortality rate of 5 per cent. While this corresponds to the average rate of mortality in other parts of the world, there may be scope for it to be reduced further by improved case management through early recognition of haemorrhagic manifestations and shock, prompt and efficient replacement of lost plasma through fluids and electrolytes, plasma/plasma expanders and platelets as indicated. Blood transfusion will be needed if there is internal bleeding. The modern regimen of treatment of Dengue Haemorrhagic Fever (DHF) and Dengue Shock Syndrome (DSS) was evolved by Thai physicians, some years back and now forms the basis of WHO recommendations[2]. This regimen has been shown to reduce the mortality rate to 2.0 per cent or less.

Dengue had been known to be endemic for over two centuries in India and for the most part had been running a benign self-limited course. All the four known serotypes of the dengue virus are now known to be in circulation. The disease has lately changed its course manifesting itself in a proportion of cases in a severe form of the disease, DHF/DSS. This new lethal manifestation of an old benign disease broke out in Manila in the Philippines for the first time in 1953; then attacked Bangkok in Thailand in 1958; Havana, Cuba experienced the worst DHF known to mankind in 1981. DHF had been raging in our immediate neighbour Myanmar since 1970. Cambodia had seen a severe outbreak of DHF last year. In Manila, dengue occurred each year after the rains. Seasonal and cyclical epidemic pattern of dengue with DHF/DSS in a proportion of cases is a recent phenomenon developing in India and Sri Lanka in the same manner as happened in the Philippines, Thailand and Indonesia. In other words, there has been a westward movement of this new paradigm into India, Pakistan, Sri Lanka and Maldives in the 1980s and early 90s in which Dengue 3 (DEN-3) had been the predominant serotype. The history of Indian dengue illustrates the well known transition from a paradigm of small outbreaks to a paradigm of major outbreaks with DHF/DSS[2-4]

The new dengue disease paradigm has now secured a firm foothold in India. The paradigm is manifesting itself extensively in Latin America and the Caribbean since last year. Its emergence as a major health problem has been most dramatic in the American region. This region had an excellent record of eradicating *Aedes aegypti* in the 1950s and 60s as a part of the Yellow Fever Control Programme, but with the discontinuation of this Programme from the 1970s, Aedes returned, and the worst ever outbreaks of dengue are now raging there. This shows that even a year's slackening of vector control measures could bring back outbreaks of