

Infectious diseases – outbreaks and epidemics

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An outbreak of plague in Surat in 1994, dengue and dengue haemorrhagic fever outbreaks in Delhi, periodic outbreaks of brain fever (Japanese encephalitis) in Bihar, mysterious fever killing children in Hyderabad, the threat of SARS, meningococcaemia, deaths due to leptospirosis following flash floods in Mumbai and now the bird flu. Every time there is an outbreak or chances of an imminent outbreak due to an infectious disease, there is a lot of public anxiety. Though this anxiety is not completely unjustified, we may not be led into the misconception that every outbreak of an infectious nature is going to spiral into a major epidemic. Here, we first need to make a distinction between an outbreak and an epidemic. Outbreak refers to appearance of disease in a small number of individuals in a limited geographical area. However if the number of the afflicted individuals goes beyond a certain limit in the population, it is designated as an epidemic. Thus, an outbreak, if not controlled effectively, can lead to an epidemic where the loss, both human/animal and economic, would be of much higher magnitude as compared to that during an outbreak. We must realize that while we have very little means to completely stop outbreaks of infectious diseases, we do have the means to prevent these spiralling into epidemics. Let us examine these two pivotal issues on their hard-core scientific bases.

What makes me comment that we hardly have much control over the appearance of disease outbreaks? First and the foremost among these is the unlimited variety of disease-causing microbes – be these viruses, bacteria or protozoan parasites that are circulating in the environment and amongst the human and animal populations around the globe. Secondly, leave aside the migratory birds, the mobility of human beings and increasing commerce especially that of food and food-related items across international borders have the potentiality to carry exotic disease-causing microbes in areas where these were never found initially. This simply means letting loose a disease-causing bug in an environment where the immunity of the local inhabitants may be either non-existent or too weak to contain

its unbridled spread. Thirdly, the unholy nexus among increasing urbanization, degradation of environment and the overburdened public health system is contributing tremendously towards the increasing outbreaks and epidemics of infectious nature. Last, but probably the one for which scientific basis is most overwhelming, is the phenomenal ability of the microbes to change themselves to their benefit. So much so that for most part, scientific ingenuity of the human beings may not be left with any option except to follow trails of the microbes rather than devise means, which could effectively pre-empt their destructive designs. Their ability to change quickly makes the therapeutic drugs and preventive vaccines ineffective within no time. It is the same ability to change or mutate quickly and the possibility of adapting to new host (human) that makes the bird flu virus H5N1 scary because such a crossover has the potentiality to initiate an epidemic or pandemic in human beings. Indeed, how the diversity of the microbes and their ability to change quickly can make development of an effective vaccine an extremely costly and drawn out battle is best exemplified by HIV/AIDS. Recent advances in the area of microbial genomics have made us aware about the tremendous repertoire and the means, at the disposal of the microbes to change themselves to continue their survival. This is not surprising in view of the fact that microbes have been around for almost four billion years, which is much more than the existence of any other living form on this planet. Their chequered evolutionary history makes them most suitable, among all living beings, to inhabit earth. Put simply, this means that we shall have to continue to live with epidemics and outbreaks. So, this brings us to how to safeguard ourselves against outbreaks and epidemics. Foremost, we must go by the age-old adage that, like most other matters of emergency, it pays to be aware and to be prepared for dealing with imminent epidemics and outbreaks. A regular monitoring or surveillance, rapid response to contain the disease in its epicentre, and to identify and root out the cause with measures like isolation of

infected individuals, culling the infected/suspected animals, rapid diagnosis and appropriate therapy constitute the major ingredients which determine how effectively an outbreak would be controlled. Rapid access to professionals with the required expertise and the opportunity of having handled a similar epidemic/outbreak in the past is always recommended. This implies networking amongst professionals, both within the country as well as across the borders. However, the whole gamut of effectively controlling an epidemic or preventing an outbreak spiralling into an epidemic is much more difficult and complicated than what is apparently mentioned above. In fact, the public health system, the health authorities and the relevant scientific institutions must work like a well-oiled machine. And, if the outbreak happens to be one that involves an animal living in close proximity to human beings as in the case of bird flu, a close interaction between human and veterinary public health officials is imperative. Keeping in view the increasing importance of such interactions, a network by the name 'MedVetNet' of European medical and veterinary experts has recently been formed.

India has come a long way since the plague outbreak in Surat in 1994. An integrated disease surveillance programme (IDSP) under the Ministry of Health and Family Welfare has been initiated and is in various stages of consolidation. It is intended to be the backbone of the public health programmes in the country. The programme intends to utilize the existing sprawling infrastructure of health care providers in the country and to improve and equip it in a way to make it expertly responsive to the future needs determined by the epidemics and outbreaks. Surveillance for early detection of emerging (new) and re-emerging (resurgent) infectious diseases constitutes the pillar of a country's preparedness for dealing with outbreaks and epidemics. A National Apical Advisory Committee (NAAC) was established in 1996 following the plague outbreak. It prepared a concept plan for the National Disease Surveillance and Response System, which was endorsed by a group of WHO experts

headed by David L. Heymann, a noted expert in the field. NAAC reviews periodically the progress regarding implementation of National Disease Surveillance and Response System and examines the epidemic preparedness of the concerned authorities. It also reviews various programmes, guidelines and mechanisms available for prevention and control of epidemic-prone diseases. It was under this programme that the High Security Animal Disease Laboratory (HSADL), a national referral laboratory, was established at Bhopal. This laboratory has the facilities to work with exotic disease-causing microbes under high containment conditions. However the inadequacy of having a single such laboratory has been amply borne-out during the current epidemic of bird flu. The announcement, by N. K. Ganguly the Director-General of Indian Council of Medical Research, of the establishment of four more such laboratories with biosafety level three (BSL-3)

facilities at Delhi, Chennai, Kolkata and Pune would go a long way in strengthening country's capability in tackling the impending danger of bird flu and other epidemics in the future. These laboratories are to be set up in collaboration with US and would be made functional within the current financial year. Similarly the establishment of ICMR School of Public Health at Ambattur and the signing of a MOU with Boston University to impart specialized training in epidemiology to students of PG diploma course would help produce experts with the state-of-the-art knowledge in the oft-neglected field of epidemiology. Such capacity building can be further strengthened by identifying laboratories engaged in research in the field of infectious diseases in scientific institutions of the country and support these appropriately. In my opinion, this is a resource, which has not been effectively utilized in our country. Even the top research institutes of our

country do not have any facilities like BSL-3 laboratories where work on highly infectious or exotic pathogens may be carried out under proper containment conditions. Such facilities should also be established at select university departments. With the international regulations related to biosafety becoming stringent everyday, this is a task that needs immediate attention. These measures would also help us in preparing for the probably much-hyped but real dangers of bioterrorism. It seems that our duel against epidemics and outbreaks will continue as ever, with the only difference that progress in science and technology will equip us better for the fight.

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