How To Deal With Emerging And Re-Emerging Infectious Diseases Globally?
N Goel, Gurpreet, H Swami

Abstract

The emergence of new infectious diseases, re-emergence of old infectious diseases and persistence of intractable infectious diseases, all led to persistence and even increase in infectious diseases in many parts of the world. Important Emerging diseases are Acquired Immuno Deficiency Syndrome (AIDS), SARS, Influenza, Hepatitis, Ebola hemorrhagic fever, Bloody diarrhea – by Escherichia coli, Cholera, Legionella pneumonia and Lymes disease. Important Re-emerging diseases are Tuberculosis, Dengue fever, Malaria, Meningococcal meningitis, West Nile fever, Bubonic plague and Hanta virus pulmonary syndrome. The factors responsible for emergence and re-emergence of these diseases are changes in human demographics, changing human behavior, increased international travel and commerce, changes in genetic make-up, inappropriate land use and irrigation projects, and inappropriate and inadequate health infrastructure, especially in developing countries. The key components of the response are Surveillance and outbreak verification, Prevention and control programs / strategies, Capacity building of Public Health infrastructure and Research.

INTRODUCTION

Infectious diseases remain among leading causes of death worldwide despite remarkable advances in medical research and treatments. According to World Health Organization 2004 World Health Report, infectious diseases accounted for about 26% of the 57 million deaths worldwide in 2002. In addition, nearly 30% of all disability adjusted life years (DALYs) could be accounted to infectious diseases. It was thought that it might be possible with interventions available to ‘close the book’ on infectious diseases and shift public health measures to chronic diseases. But emergence of new infectious diseases, re-emergence of old infectious diseases and persistence of intractable infectious diseases, all led to persistence and even increase in infectious diseases in many parts of the world.

DEFINITIONS

EMERGING INFECTIOUS DISEASES
It includes outbreaks of previously unknown diseases or known diseases whose incidence in humans has significantly increased in the past two decades.

RE-EMERGING INFECTIOUS DISEASES
These are the known diseases that have reappeared after a significant decline in incidence.
IMPORTANT EMERGING DISEASES

At least 30 previously unknown diseases have emerged since 1973. Some important ones are:

**FACTORS RESPONSIBLE FOR EMERGENCE & RE-EMERGENCE OF DISEASES,**

Human demographic: Ever increasing world population and migration of masses in search of job to urban areas, leading to overcrowding, inadequate sanitation and hygiene, which provide an ideal breeding ground for infectious agents.

Human behavior: Changing family structure, risky sexual activity, drug abuse, outdoor recreation, changing eating patterns, have all increased the spread of infectious agents. Imprudent use of microbial drugs, decreased compliance with vaccination policy, use of deadly pathogens such as small pox and anthrax, as agents of bioterrorism, have all led to re-emergence of diseases which were thought to be controlled previously e.g. HIV/AIDS, tuberculosis, malaria.

International travel & commerce: Increased international travel, especially without taking appropriate vaccine and other protective measures, lead to increased infection in travelers, brining infection back home. Increased commerce through increased import of food materials from developing to developed countries lead to increase in food-borne diseases in developed countries. Moreover, increased trade in exotic animals for pets and food sources has contributed to rise in opportunity for pathogens to jump from animal reservoir to humans e.g. monkey pox.

Changes in genetic make-up: Natural genetic variations, re-combinations and adaptations allow 'new' strains of known pathogens to appear. e.g. influenza.

Land use: Inappropriate land use and irrigation projects, upset local ecology and creates new habitats. Encroachment
of human civilization on the environment disturbs delicate balance which humans share with the microbes. Diseases like lyme disease has emerged as a result of disturbance of this balance.

Health infrastructure: Inappropriate and inadequate health infrastructure, especially in developing countries has been unable to cope with increasing demands.

RESPONSE TO THREAT
In response to this threat of emerging and re-emerging infectious diseases, various international & national organizations have come together to combat this threat. Various agencies like World Health Organization (WHO), Centre for Disease Control (CDC), National Institute of Health (NIH), Department of Defense & FDA, all have come together to work in collaboration to develop strategic plans to combat the microbial emergence and re-emergence.

The key components of the response are:

SURVEILLANCE
GLOBAL / REGIONAL LEVEL LABORATORY SURVEILLANCE
GLOBAL / REGIONAL LEVEL EPIDEMIOLOGICAL SURVEILLANCE
GLOBAL & NATIONAL SURVEILLANCE SYSTEMS / NETWORKS
EXAMPLES OF NETWORKS
In addition to above networks, following networks are also there for surveillance of various emerging and re-emerging diseases:

Outbreak Verification: Outbreak verification system was established by WHO in 1997. After receiving report of the disease outbreak WHO investigates them to confirm its public health importance and exact nature. An outbreak verification team is formed for the purpose.

PREVENTION AND CONTROL
CAPACITY BUILDING / INFRASTRUCTURE DEVELOPMENT
Research: Various organizations like CDC, National Institute of Allergy & Infectious Diseases (NIH), National Institute of Diabetes (NIDDK), Digestive and Kidney diseases, has made research contributions in field of HIV/AIDS, Tuberculosis, Malaria, Hepatitis C etc. Advances in genomics, proteomics have helped in better understanding of pathogenesis, host community and drug resistance and are helping in identifying new drug targets and develop new vaccines and diagnostics. Progress in synthetic chemistry, robotics, computer, modeling and developments in molecular and genetic epidemiology are all helping to understand the pathogens, host factors, transmission patterns.

FUTURE OUTLOOK

CORRESPONDENCE TO
Dr. N.K. Goel Professor Deptt. of Community Medicine, Government Medical College & Hospital, Sector-32, Chandigarh, INDIA Phone- +91172-2665253 Ext. 1043 Mobile- +919876521536 e-mail: goelnaveen2003@yahoo.co.in

References
Author Information

N. K. Goel, MD, FIPHA
Dept. Of Community Medicine, Govt. Medical College

Gurpreet, MD
Dept. Of Community Medicine, Govt. Medical College

H. M. Swami
MD, FIAPSM, Dept. Of Community Medicine, Govt. Medical College