

Chapter 10

Public Health Surveillance System: Infectious Diseases

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ABSTRACT

To guard people against some grave infectious disease, the surveillance system is a key performance measure of global public health threats and vulnerability. The diseases surveillance system helps in public health monitor, control, and prevent infectious diseases. Infectious diseases remain major causes of death. It's important to monitor and surveillance worldwide for developing a framework for risk assessment and health regulation. Surveillance systems help us in understanding the factors driving infectious disease and developing new technological aptitudes with modeling, pathogen determination, characterization, diagnostics, and communications. This chapter discussed surveillance system working, progress toward global public healthy society considering perspectives for the future and improvement of infectious disease surveillance without limited and fragmented capabilities, and making even global coverage.

INTRODUCTION

Infectious diseases have been a huge health burden in the global history of mankind. New emerging disease such as Corona virus disease (COVID-19), Ebola, H5N1 and H7N9 avian influenza viruses,

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and the Middle East respiratory syndrome corona virus along with emergence of drug resistance in pathogens causing infectious disease like tuberculosis and malaria are the major causes for morbidity and mortality worldwide (Fauci, A.S., 2001). A competent surveillance system is a powerful tool that can play a dynamic role in controlling and monitoring the outbreak of infectious diseases. The results of the surveillance system result in the establishment of new public health policies that may be useful in protecting public health. The surveillance system is a basic tool in understanding the burden of a disease over time, detect changes in disease outbreaks, determine risk factors for the disease and populations at greatest risk, guide immediate public health actions for individual patients or the community and thus formulate policies for the effective control measures for preventing the infectious diseases and other epidemics. The surveillance method for the controlling of diseases was first time applied by William Farr and Wales from the General Registrar's Office of England and Wales in the mid-1800s where they collected morbidity data from few communities in other countries (Thacker, S. B., 2000; Brachman, 2009). In 1878, the Public Health Service of the United States collected the morbidity data due to plague, yellow fever, cholera, and smallpox (Langmuir, A. D., 1963; Thacker, S. B., & Berkelman, R. L., 1988). In this period, surveillance system covered communicable diseases, non-communicable diseases, bioterrorism trials, immunizations, and other health care delivery (Thacker, S. B., 2000; Brachman, 2009). In 1961, all of the data related to the morbidity of infectious diseases was moved to the communicable disease center currently known as the Centers for Disease Control and Prevention (CDC), Atlanta, Georgia.

In recent years, the surveillance system is comprehensive on viral outbreaks with focus on Human Immunodeficiency Virus and Acquired Immune Deficiency Syndrome (HIV/AIDS), West Nile virus infection, avian influenza, severe acute respiratory syndrome (SARS), and current spread of COVID-19 worldwide. At present, 59 diseases are reported weekly to the CDC and seven other diseases are informed exclusively (monthly or yearly). Three diseases namely yellow fever, plague, and cholera are subject to the International Health Regulations adopted by the World Health Assembly (1951). These mechanisms provide security against the international spread of epidemic diseases with a minimum interference with world traffic. Each country should inform World Health Organization (WHO) within the first 24 hours of diagnosis of the first suspected case on its territory and all following cases and deaths are to be reported to WHO. In case of infectious diseases with high fatality rates (such as meningococcal disease), most countries require rapid reports of the first occurrences of suspect cases. For diseases, such as pneumonia or AIDS, weekly, monthly, or quarterly case reports are required. The reporting requirements for infectious diseases are nationally or sub-nationally determined. For example leishmaniasis needs to be notified in high risk countries but not in all. Similarly, reporting of HIV is required in some states in the United States of America but not in others. The WHO maintains surveillance for Yellow fever, Plague, Cholera, African trypanosomiasis, Meningococcal disease, Dengue, Influenza, HIV/AIDS, Leishmaniasis and Leishmania/HIV co-infection. WHO helps several countries in the world to maintain their National disease surveillance programs and report cases differently according to the type and frequency of the disease. Detection and reporting of all infectious diseases is of prime importance since new emerging strains have the potential to cause new epidemics and pandemics leading to huge economic loss. For example England is a small country with a population of approximately 66.87 million individuals. The infectious diseases account for 7% of deaths and annual costs of £30bn (Health Protection Agency, 2020). The disease epidemic can economically weaken any country as evident by the 2003 SARS outbreak that were not only limited to Asian countries but were also seen worldwide. The economic cost (direct and indirect) of SARS are assessed at US\$80 billion (Knobler, S., et al., 2004). The discussion in the current chapter is based on the risks associated with the endemic diseases and how the health problems

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