



Emerging infectious diseases

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Received date: May 5, 2021; Accepted date: May 20, 2021; Published date: May 27, 2021

Editorial

Emerging infectious diseases are those due to newly identified and previously unknown infections which cause public health problems either locally or internationally. Recent emerging diseases include a highly fatal respiratory disease caused by a virus called *Sin Nombre*; a variant of Creutzfeldt-Jakob disease, a disease of the central nervous system which is suspected, though not proven, to be associated with a similar disease in cattle called bovine spongiform encephalopathy; HIV infection which causes AIDS, with its sequel of human suffering and economic burden; and diseases such as Ebola hemorrhagic fever with a potential for international spread. Other examples of new or newly detected infectious diseases of global concern include a new form of cholera, a hemolytic uremic syndrome, hepatitis C and hepatitis E, Legionnaires' disease, and Lyme disease. Although it is not always possible to know if these diseases are new in humans, or whether they have been present but unrecognized throughout the years, many emerging diseases are thought to be due to a closer contact of man with their reservoirs in nature, with a successful "jump" of the infectious agent from animal to man across the species barrier. Infectious diseases have repeatedly reshaped the course of civilization, resulting in significant human suffering and death along with substantial economic costs. Over the past 40 years, there has been a 4-fold increase in the number of emerging pathogens, such as extensively drug-resistant tuberculosis (XDR-TB), Severe Acute Respiratory Syndrome Corona virus (SARS-CoV), pandemic H1N1, Middle East Respiratory Syndrome Corona virus (MERS-CoV), Nipah virus, Zika virus, Multi Drug Resistant Organisms (MDROs), and Ebola virus.¹ Public health threats and infectious diseases respect neither boundaries nor barriers, and 70% of the world is underprepared to prevent, detect, and respond to them quickly and effectively. In this era of increasingly mobile and connected populations, it is possible for an infection to spread around the world in 24 to 48 hours, due to urbanization, human behavior, and rapid transportation networks. Most emerging infections appear to be caused by pathogens already present in the environment, brought out of obscurity or given a selective advantage by changing conditions and afforded an opportunity to infect new host populations on rare occasions, a new variant may also evolve and cause a new disease. The process by which infectious agents may transfer from animals to humans or disseminate from isolated groups into new populations can be called microbial traffic.

SARS CoV-2, the virus responsible for the COVID-19 pandemic, is the latest novel pathogen to emerge, leading to over 95 million cases and 2 million fatalities globally as of January 18, 2021. Although the pandemic has had a broad human, economic, and social impact, it is one of many infectious diseases that has had important public health implications over the past year. In this article, we review and discuss some of the most notable infectious disease outbreaks and trends of the past year and where appropriate, indicate how they were impacted by COVID-19.

A number of activities increase microbial traffic and as a result promote emergence and epidemics. In some cases, including many of the most novel infections, the agents are zoonotic, crossing from their natural hosts into the human population; because of the many similarities, I include here vector-borne diseases. In other cases, pathogens already present in geographically isolated populations are given an opportunity to disseminate further. Surprisingly often, disease emergence is caused by human actions, however inadvertently; natural causes, such as changes in climate, can also at times be responsible. Although this discussion is confined largely to human disease, similar considerations apply to emerging pathogens in other species.

Emerging infectious diseases are infections that have recently appeared within a population or those whose incidence or geographic range is rapidly increasing or threatens to increase in the near future. Emerging infections can be caused by:

- Previously undetected or unknown infectious agents
- Known agents that have spread to new geographic locations or new populations
- Previously known agents whose role in specific diseases has previously gone unrecognized.
- Re-emergence of agents whose incidence of disease had significantly declined in the past, but whose incidence of disease has reappeared. This class of diseases is known as re-emerging infectious diseases.
- The World Health Organization warned in its 2007 report that infectious diseases are emerging at a rate that has not been seen before.
- About 40 infectious diseases have been discovered, including SARS, MERS, Ebola, chikungunya, avian flu, swine flu, Zika and most recently COVID-19, caused by a new corona virus, SARS-CoV-2.
- With people traveling much more frequently and far greater distances than in the past, living in more densely populated areas, and coming into closer contact with wild animals, the potential for emerging infectious diseases to spread rapidly and cause global epidemics is a major concern.