

## MODERN TRENDS OF INFECTIOUS DISEASES

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Given the ubiquitous nature of microorganisms and the many occasions on which they come into contact with humans, it is surprising how infrequently infectious diseases occur. The reason why some organisms can peacefully coexist with humans while others go on to produce disease lies in the nature of the interaction between microbe and host. Much has been learnt in recent years about mechanisms of microbial disease, especially at the molecular and cellular levels. There is a growing awareness of the active contribution of the environmental context of infection. Knowledge of these processes is necessary to understand how to diagnose, treat and prevent infection effectively. The initial encounter with a new microbial species may result in nothing more than short-lived contact with an external body surface. The microorganism needs to survive and multiply under local conditions (e.g. of temperature and pH) to establish itself in its new habitat.

It must successfully compete against an established indigenous microbial flora and resist local defence mechanisms. Some species are capable of producing mucolytic enzymes to help them penetrate the layer of mucus coating internal body surfaces. Other species have specific adhesins that enable binding with receptor sites on human cells (e.g. gonococcal pili attachment to urethral epithelium and influenza virus adherence to glycoprotein receptors on upper respiratory mucosal cells). Locally active IgA produced by some mucosal surfaces can be inactivated by bacteria such as *Haemophilus influenzae*, *Streptococcus pneumoniae* and *Neisseria meningitidis*, which produce IgA protease. Once established on a body surface, an organism is said to have colonised that site.

The classical study of infectious diseases was conducted by a British physician, John Snow, between 1849 and 1854. During this period a series of outbreaks of cholera occurred in London. He found that cholera was spread by drinking water from a pump that was contaminated with raw sewage containing the pathogenic microorganisms. Thereafter, the pump was removed. Consequently the number of cholera cases remarkably declined. The second example is the outbreak of —Typhoid Marryll between 1896 and 1906 in New York City. An infectious disease is any change in a state of normal health in which part or the whole body of an individual does not function properly due to the presence of an infectious agent or its products. The

phenomenon of growth, multiplication and establishment of an infectious agent in host tissues or within the cells is known as infection. When a microorganism or agent lives on expense of the host i.e. derives nutrients for its growth, it is called parasite. However, if a parasite or its products cause(s) disease, the former is known as the pathogen. The ability of a pathogen to cause disease is termed as pathogenicity. The series of events involved for proper establishment of a pathogen in host cells/tissue (i.e. the process of disease development) is known as pathogenesis.

Epidemiology (epi means upon, demos means population, logy means study) is the science that deals with occurrence, determination, distribution and control of a disease. An individual who studies the epidemiology is called epidemiologist. When a disease occurs occasionally and at irregular intervals in a human population, it is known as sporadic disease e.g. typhoid. A disease maintaining a steady, low level frequency at a regular interval is called endemic disease e.g. common cold. However, a sudden increase in occurrence of a disease beyond a limit is called epidemic (upon the people). If the occurrence of a disease increases within a large population over a wide region, it is called pandemic (pan means all). Frequency of a disease refers to its repeated occurrence as fractions in a given population. To measure the frequency, the epidemiologists use statistics and find out the rate of increase over the pre-existing cases! It is measured as an increase over per 100 or per 1000 individuals.

By measuring frequency one can speculate how severe a disease is? However, it is also related to morbidity or mortality. Morbidity is the number of individuals becoming ill by a specific disease within a susceptible population during a defined period. The infectious diseases have characteristic signs and symptoms. Signs are objective changes in body, for example fever. On the basis of fever a disease can be recognised. Symptoms are the subjective changes for example pain, loss of appetite, etc. which are felt by the patients. In a broad sense symptom is used for sign as well. In addition, a disease syndrome includes a set of signs and symptoms due to a particular disease; for example an AIDS patient experiences disease syndrome. Moreover, the characteristic symptoms of a disease develop during certain phases. The knowledge of the phases helps in recognition of a disease. For example, incubation period which refers to time required after infection to the appearance of signs/symptoms. Incubation period varies organism to organism. Second is the prodromal stage i.e. the period during which there is onset of signs and symptoms of a disease. It cannot be clearly found out. Third, the period of illness which is a phase during which the disease gets fully established and becomes most severe with characteristic signs and symptoms. The immune system is triggered. The last characteristic phase is the period of decline when signs and symptoms disappear and the disease is recovered gradually. This stage is known as convalescence.

Effective treatments accelerate recovery, in terms of our model an increase in or a reduction in morbidity or mortality, that is, an increase in and a decrease in respectively. Apart from the immediate benefits to patients, treatments can have large macroeconomic value, especially for diseases such as HIV that offer poor (or, indeed, no) prospects for natural recovery and that are progressively debilitating and ultimately fatal.

Modern form of infection is Coronaviruses. They are a group of related RNA viruses that cause diseases in mammals and birds. In humans and birds, they cause respiratory tract infections that can range from mild to lethal. Mild illnesses in humans include some cases of the common cold (which is also caused by other viruses, predominantly rhinoviruses), while more lethal varieties can cause SARS, MERS and COVID-19, which is causing the ongoing pandemic. In cows and pigs they cause diarrhea, while in mice they cause hepatitis and encephalomyelitis.

Coronaviruses constitute the subfamily Orthocoronavirinae, in the family Coronaviridae, order Nidovirales and realm Riboviria. They are enveloped viruses with a positive-sense single-stranded RNA genome and a nucleocapsid of helical symmetry. The genome size of coronaviruses ranges from approximately 26 to 32 kilobases, one of the largest among RNA viruses. They have characteristic club-shaped spikes that project from their surface, which in electron micrographs create an image reminiscent of the stellar corona, from which their name derives. Coronaviruses vary significantly in risk factor. Some can kill more than 30% of those infected, such as MERS-CoV, and some are relatively harmless, such as the common cold. Coronaviruses can cause colds with major symptoms, such as fever, and a sore throat from swollen adenoids. Coronaviruses can cause pneumonia (either direct viral pneumonia or secondary bacterial pneumonia) and bronchitis (either direct viral bronchitis or secondary bacterial bronchitis). The human coronavirus discovered in 2003, SARS-CoV, which causes severe acute respiratory syndrome (SARS), has a unique pathogenesis because it causes both upper and lower respiratory tract infections.

To sum up given facts it should be noted that Good health is central to human happiness and well-being that contributes significantly to prosperity and wealth and even economic progress, as healthy populations are more productive, save more and live longer. For a healthy life cycle, you need a healthy and balanced diet, good hygiene habits, staying in a proper shelter and getting enough sleep. In addition, you will have to participate in physical activities, weight management, and stress management activities. Health has an important role in feeling happy, as there are many people who suffer from diseases, but the health enables them to fight diseases, as a result, they achieve physical fitness and feel comfortable or enjoy life like any normal person.



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