



Modes of Transmission of Infectious Organisms

A mode of transmission refers to the way in which an infectious organism is spread.

Why is it useful to understand modes of transmission?

Once you know the modes of transmission of an organism, you can understand better how to control it. This can be very helpful since there are many organisms that can cause disease and only a limited number of modes of transmission. Information on the modes of transmission can be used to limit disease even before an infectious agent is identified and characterized.

There may be times when little is known about an organism that is causing a disease. The organism may be introduced intentionally, as has occurred in terrorist events, or disease may arise from a new or emerging infectious agent such as SARS. Sometimes epidemiologists can infer the modes of transmission of unknown infections from available data.

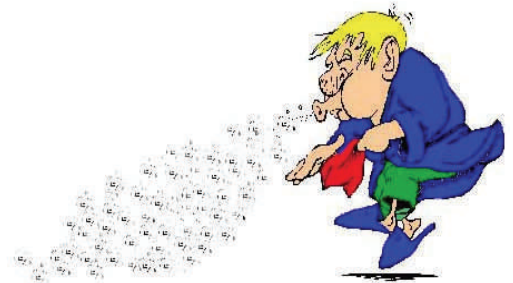
What are the modes of transmission?

An organism may spread from an infected person to an uninfected person by direct or indirect transmission modes. Direct transmission of an organism occurs in the following ways:

- **Direct contact** – Spread by direct contact with infected skin, mucus membranes, or body fluids.
- **Droplet spread** – Spread in droplets produced by sneezing, coughing or talking. An uninfected person can become infected by inhaling the droplets. Droplet spread is considered direct transmission because a spray of droplets can only go a few feet before it falls to the ground.

Indirect transmission involves spread via an intermediary:

- **Airborne** – Spread through the air. An organism spread in this way can be suspended in air. It is similar to a droplet spread organism because an infected person can spread it by coughing, sneezing or talking, and an uninfected person can become infected by inhaling the organism.
However, the droplet spread and airborne transmission are different in a very important way. Droplet spread organisms can only contaminate nearby air while airborne organisms can spread infection over a much wider area.
- **Vehicle-borne** - Spread from one person to another by an inanimate intermediary. Vehicles include food, water and objects.
- **Vector-borne** - Spread by animals, most often arthropods. Vector-borne diseases include those spread by ticks and mosquitoes.



What are the modes of transmission of diseases that may result in a public health emergency?

Smallpox – droplet spread, direct contact, rarely airborne
Influenza – droplet spread, vehicle-borne
Salmonella – vehicle-borne, direct contact
Tuberculosis – airborne
Cutaneous Anthrax – direct contact
Pneumonic Plague – airborne

- In some classifications the mode of transmission of gastrointestinal organisms, such as salmonella, which are spread by direct contact and vehicle-borne transmission, is referred to as fecal-oral.
- Mutations that naturally occur in infectious agents rarely cause a change in the mode of transmission.

Are all infectious agents spread from person-to-person?

Some organisms are not spread from person-to-person. A person may become infected by the organism if he or she is exposed to it in the environment. In this case, public health measures can focus on identifying and limiting exposure to the source and treating or prophylaxing those who may have been exposed to it. Some diseases caused by potential bioterrorist agents are not spread from person-to-person, including botulism and inhalational or gastrointestinal anthrax.

References:

Centers for Disease Control and Prevention.. Principles of Epidemiology. Available at http://www.phppo.cdc.gov/phtn/catalog/pdf-file/Epi_Intro_1.pdf.

Centers for Disease Control and Prevention Diseases and Conditions web pages. Available at <http://www.cdc.gov/node.do/id/0900f3ec8000e035>.



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