

Epidemiology

- The study of factors and mechanisms involved in the frequency and spread of diseases and other health-related problems within populations of humans, animals and plants.
- Etiology is the study of the cause of disease.

Epidemiology

- Communicable Disease
 - Disease transmitted from one host to another
- Non-communicable Disease
 - Not transmitted from one host to another
 - Usually caused by one's own normal flora or an environmental reservoir

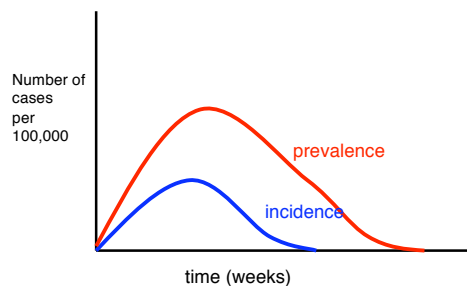
Morbidity and Mortality Frequencies

- Morbidity rate
 - the number of individuals affected by the disease in a certain period of time in relation to the total number in the population.
- Mortality rate
 - the number of deaths due to a disease in a population during a specific period in relation to the total population.

Incidence versus prevalence

- Incidence
 - the number of NEW cases of a disease in a population within a specific period of time.
- Prevalence
 - the TOTAL NUMBER of people infected within the population at any time.

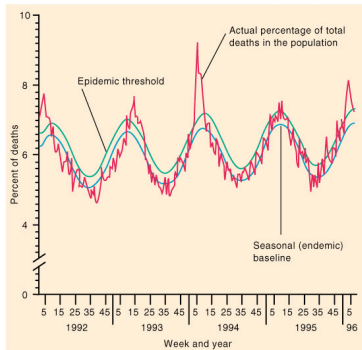
Incidence and prevalence rates



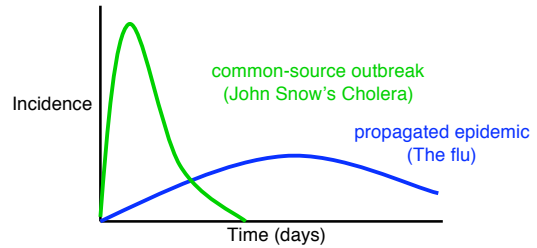
Diseases in populations

- Endemic
 - Present continually in the population of a given geographical area.
- Epidemic
 - Disease suddenly has higher than normal incidence in the population
- Pandemic
 - Worldwide epidemic

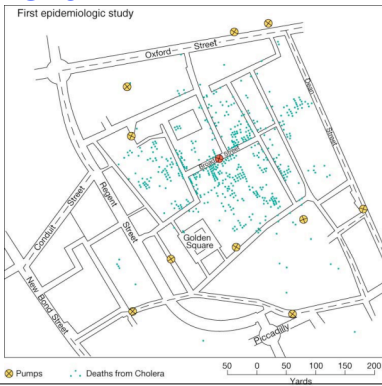
Rates of Disease in a population



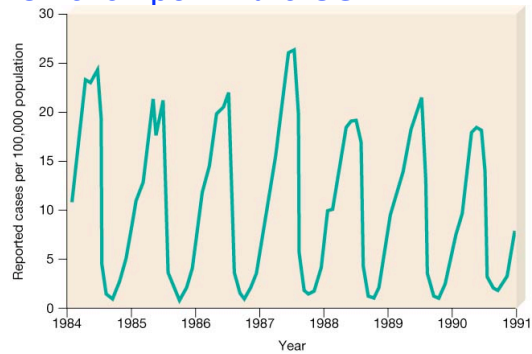
Common source vs. propagated epidemic



John Snow



Chicken pox in the US



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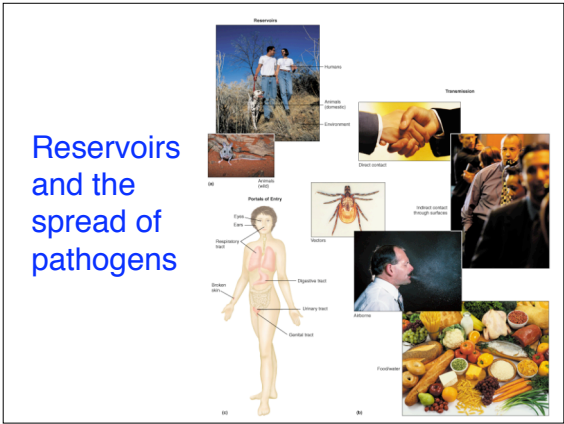
Table 20.1 Common Terms in Epidemiology

Term	Definition
Attack rate	The proportional number of cases developing in the population that was exposed to the infectious agent
Communicable disease	An infectious disease that can be transmitted from one host to another
Endemic	A disease or other occurrence that is constantly present in a population
Epidemic	A disease or other occurrence whose incidence is higher than expected
Herd immunity	A phenomenon that occurs when a critical concentration of immune hosts prevents the spread of an infectious agent
Incidence	The number of new cases of a disease in a population at risk during a specified period of time
Index case	The first identified case of a disease in an outbreak or epidemic
Morbidity	Illness. Most often expressed as the rate of illness in a given population at risk
Mortality	Death. Most often expressed as a rate of death in a given population at risk
Non-communicable disease	A disease that is not transmitted from one host to another
Outbreak	A cluster of cases occurring during a brief time interval and affecting a specific population; an outbreak may herald the onset of an epidemic
Pandemic	A worldwide epidemic
Portal of entry	Surface or orifice through which a disease-causing agent enters the body
Portal of exit	Surface or orifice from which a disease-causing agent exits and disseminates
Prevalence	The total number of cases in a given population at risk at a point in time
Reservoir	The natural habitat of a disease-causing organism

Reservoirs of Infection

- Human reservoirs
 - Carriers (symptomatic or asymptomatic)
 - Often there are no signs of the disease
 - Chronic carrier
 - Long time
 - Intermittent carrier
 - Periodically releases organisms
- Animal reservoirs
 - Zoonoses
 - Rabies, plague,
- Non-living reservoirs (Environmental)
 - Soil, food, water (cholera, anthrax)

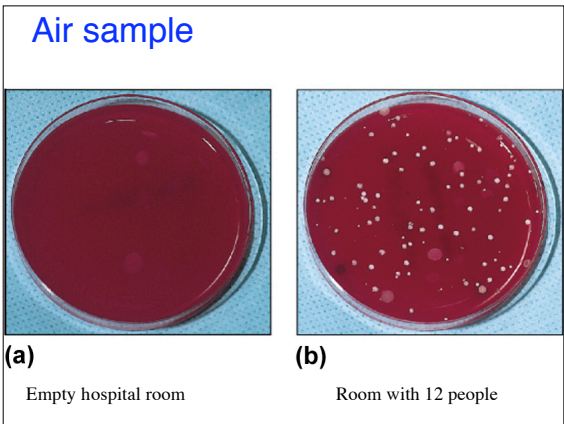




- ### Portals of exit
- Eyes (tears)
 - Nose (secretions)
 - Ear (ear wax)
 - Skin (flakes)
 - Mouth (sputum)
 - Mammary glands (milk, secretions)
 - Vagina (secretions, blood)
 - Urethra (urine)
 - Seminal vesicle (semen and other secretions)
 - Anus (feces)
 - Broken skin (blood)

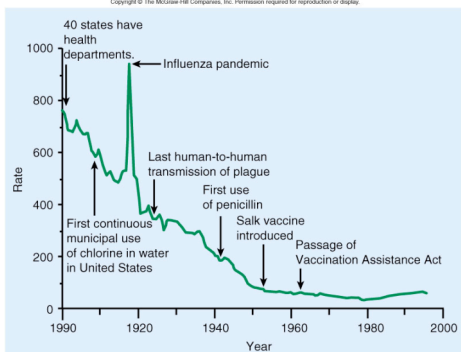
- ### Portals of entry
- Eye
 - Ear
 - Nose
 - Mouth
 - Anus
 - Urethra/vagina
 - Mammary glands
 - Wounds
 - Placenta

- ### Modes of Transmission of Diseases
- Horizontal Transmission
 - Contact with food, water, or living agent
 - Vertical transmission
 - Mother to fetus or child (breast feeding)
 - Contact transmission
 - Direct contact
 - Fecal, oral, touching (herpes)
 - Indirect contact
 - Fomites (non living objects, clothes, doorknobs, utensils)
 - Droplets (coughs, sneezes)
 - Vehicle transmission
 - Waterborne (sewage)
 - Airborne (viruses, air conditioning systems)
 - foodborne



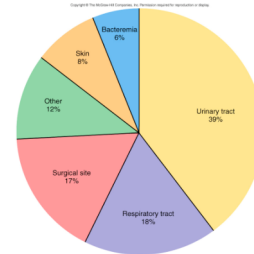
- ### Modes of Transmission of Diseases
- Vector transmission (living organisms)
 - Mechanical vectors
 - food, or insect bodies
 - Biological
 - ticks, fleas

Infectious Disease Death Rate in the US

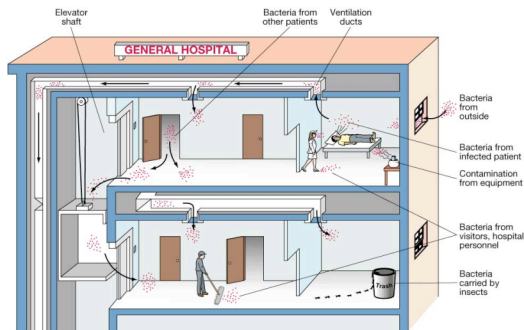


Nosocomial Infections

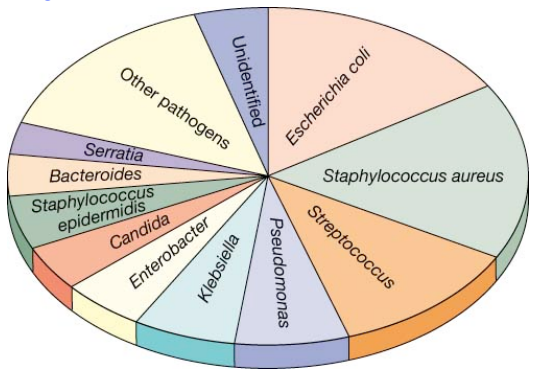
- Nosocomial infections
 - hospital-acquired infections
- factors
 - Length of time of exposure
 - Manner of exposure
 - Virulence and number of organisms
 - State of host defenses



Transmission of nosocomial infections



Organisms that cause nosocomial infections



Common nosocomial infections

- Commonly implicated organisms include
 - *Enterococcus* species
 - Part of normal intestinal flora
 - *Escherichia coli* and other species in family *Enterobacteriaceae*
 - Part of normal intestinal flora
 - *Pseudomonas* species
 - Common cause of nosocomial pneumonia and urinary tract and burn infections
 - *Staphylococcus aureus*
 - Survives in environment for prolonged periods
 - Easily transmissible to fomites
 - Other *Staphylococcus* species
 - Often part of normal skin flora