

- **Epidemic**- occurrence of expected number of cases among a group of people over time
- **Incidence**- # of new cases in a population
- **Prevalence**- # of cases in a population (per 10,000 or 100,000)
- **Outbreak**- more cases of particular disease than expected in given area over given time
- **Endemic**- large numbers of people over geographic area distribution affected with the same disease
- **Pandemic**- an epidemic spanning a very wide area
- **Vector**- an animal intermediate that transmits a pathogen to humans
- **Virulence**- Degree or intensity of pathogenicity of an organism
- **Compromised host**- host with lowered resistance to infection
- **Nosocomial infection**- an infection that is traced back to a hospital
- **Infectivity**- capacity to cause infection in a susceptible host
- **Pathogenicity**- capacity to cause disease in a host
- **Virulence**- severity of disease that the agent causes to host
- **Case definition**- The onset of ___(symptoms) in a ___(person) at ___(time and place)
- **Confirmed**- diagnosis by lab verification
- **Probable**- many factors point to diagnosis, but no lab verification
- **Suspected**- some factors point to diagnosis
- **Reservoir**- site that harbors pathogenic organisms (human, animal, soil)
- **Mortality rate**- # sick divided by # exposed
- **Mortality rate**- # dead per 100,000 population
- **Case Fatality rate**- # dead divided by # sick
- **Modes of transmission**- droplet (through air, flu, TB, SARS, hantavirus), blood (sexual or injected, HIV, hepatitis), direct contact (touching, leprosy, chicken pox), oral-fecal (contaminated water, cholera, giardia), vector (spread by animal, malaria, Lyme disease)
- **AIDS**- acquired immunodeficiency syndrome, spread by blood/ sexually, attacks immune system
- **Tuberculosis**- caused by bacteria, cough, fever, fatigue, weight loss, treated by antibiotics, attacks respiratory system or other parts of body
- **Malaria**- caused by protozoan, spread by mosquitoes (anophelies), cyclic fever & chills
- **2 Titles**: Person, Place, Time, Agent, Host, Environment
- **Index Case**: The first case in an outbreak
- **Virus**: 1. Are small, much smaller than bacteria 2. not composed of cells 3. have 2 basic components: DNA or RNA covered in protein. Viruses can only reproduce inside the cells of other living organisms (rabies, AIDS, SARS, ebola, measles)
- **Bacteria**: Bacteria have 1 cell and no nucleus. DNA and ribosomes float in the cell. They have flagella to help them swim. They have no cell organelles. Gram + bacteria have a strong cell wall with peptidoglycan and a capsule. Bacteria also have pill that help stick. (E. coli, streptococcus, diphtheria, MRSA, Lyme disease)

Shapes: spherical (cocci) Arrangements: staph (clumps) Srep (chain)
 Rod (bacilli) Spiral (spirilla or spirochete)

Cohort Study- used for outbreaks in small, well-defined populations, moves forward or backward from exposure

Disease?	Disease +	Disease -
Exposed	(A)	(B)
Unexposed	(C)	(D)

Attack Rate- exposed $A/(A+B)$ unexposed $C/(C+D)$

Relative Risk- $[A/(A+B)]/[C/(C+D)]$

Relative Risk > 1: more likely

Relative Risk < 1: possible protective effect

0 → 1 →

Case control Study- used when groups are not well-defined compares people with the disease to people without, works backward

Exposed	Case Patients	Controls
Yes	(A)	(B)
No	(C)	(D)

Odds ratio: $(A/C) / (B/D) = (A \times D) / (B \times C)$

A= # of case patients exposed

B= # of control people exposed

C= # of case patients unexposed

D= # of control people unexposed

- **Cholera**- Vibrio Cholerae (oral-fecal)
- **Campylobacter Enteritis**- campylobacter jejuni (oral-fecal)
- **Chicken Pox**- varicella zoster (droplet and direct contact)
- **Chlamydia**- Chlamydia trachomatis (sexually)
- **E. coli**- E. coli (oral-fecal)
- **Malaria**- plasmodium (vector, anophelies mosquito)
- **MRSA**- staphylococcus aureus (direct contact)
- **SARS**- coronavirus (droplet)
- **Leprosy**- mycobacterium leprae (direct contact)
- **Schistosomiasis**- schistosoma (oral/contact with water)
- **Shingles**- herpes zoster (contact, droplet)
- **Strep throat**- streptococcus (droplet)
- **Tuberculosis**- mycobacterium tuberculosis (droplet)
- **Tetanus**- clostridium tetani (contact)
- **Ebola**- filoviridae (contact/blood)
- **Athlete's foot**- trineas pedis (contact)
- **Jakob**- Cruetzfeldt prion (ingestion)
- **Tapeworm**- nematode (ingestion)
- **Hepatitis**- hepatitis a, b, c virus (a: oral fecal, b: sexually)
- **Giardia**- giardia lamblia (direct contact)

Types of epidemic:

- **Point source** - An epidemic in which all cases are infected at the same time, usually from a single source or exposure.
- **Continuous source** - An epidemic in which the causal agent (e.g. polluted drinking water, spoiled food) is infecting people who come into contact with it, over an extended period of time.
- **Person-to-Person** (a.k.a. Propagated) - An epidemic in which the causal agent is transmitted from person to person, allowing the epidemic to propagate

Chain of Transmission

Reservoir

Portal of Exit

Mode of Transmission

Portal of Entry

Host Types:

(Can be infected)
 Susceptible
 Infected
 Immune



Study design	Strength	Weakness
Case-control	Good for rare disease or long latency, examine multiple exposures from a single outcome; less expensive and quicker to conduct than cohort study	Possible error in recalling past exposure (Recall Bias). Possible time-order confusion
Cohort	Examining multiple outcomes for a single exposure; examine rare exposures (such as asbestos but not for rare disease); can calculate the incidence of disease (while case control cannot); best technique for an outbreak in a small, well defined population; most accurate observational study	Not good for rare diseases; costly in time and resources; possible loss to follow up over time; factor, which may be many years in the past or may be seen as socially (un)desirable
Cross-sectional	Relatively short duration; can study several outcomes; least expensive	Since exposure and disease status are measured at the same point in time, it may not always be possible to distinguish whether the exposure preceded or followed the disease.
Experimental or Trial	Most scientifically sound, best measure of exposure	Time consuming and Expensive; Unethical for Harmful Exposures

Bacterial	Fungal	Viral	Parasitic
Food poisoning	Candidiasis	Influenza	Chagas Disease
Gonorrhea	Fungal Meningitis	Chickenpox	Ascari
TSS	Genital warts	HIV/AIDS	Strongyloides
Cholera	Aspergillus	Herpes	Malaria
Gastro & ulcers	Athlete's foot	Mumps, measles, rubella	Quarries Giardiasis
Pneumonia	Ringworm	HPV	trichomoniasis
Ear infections & strep throat		Shingles	toxoplasmosis

10 Steps to Outbreak Investigation

- 1) Prepare for field work- Research disease, prepare to travel, make arrangements with personal contacts
- 2) Establish the existence of an outbreak- compare current number of cases to previous cases, use health records, documents, etc.
- 3) Verify diagnosis- Review clinical and laboratory results for the cases, interview patients
- 4) Define and identify cases- establish case definition, have clinical info, characteristics of the people, place, time, etc.
- 5) Describe and orient the data in terms of person, place, and time- use epi curve to describe how many cases at what time
- 6) Develop hypotheses- consider disease, interview people who are ill, try and notice what certain characteristics make people have the disease
- 7) Evaluate hypotheses- compare with established fact, use statistics, use case-control or cohort studies
- 8) Refine hypotheses- study environment, use data for more insight
- 9) Control and Prevention measures- immunization, medicine, isolation, carry out as soon as possible
- 10) Communicate findings- Oral briefing for local health authorities, written report for archives

Outbreak Study Guide

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A Pocket Guide to Epidemiology David G. Kleinbaum, Kevin M. Sullivan, Nancy D. Barker, 2007-03-11 In the nearly three years since the publication of the ActivEpi companion text the authors received several suggestions to produce an abbreviated version that narrows the discussion to the most essential principals and methods A Pocket Guide to Epidemiology contains less than half as many pages as the ActivEpi Companion Text and is a stand alone introductory text on the basic principals and concepts of epidemiology

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Introduction to Epidemiology Merrill, 2017 Introduction to Epidemiology Seventh Edition is the ideal introductory text for the epidemiology student with minimal training in the biomedical sciences and statistics

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Alcamo's Fundamentals of Microbiology Jeffrey C. Pommerville, 2004 Biological Sciences

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