

Investigation of Epidemics

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Epidemic

Epidemic

infectious disease

Non-infectious disease

Endemic

Types of epidemics

Common-source epidemics

Epidemic curve

Propagated-source epidemics

Steps in the investigation of an epidemic)

- Verify diagnosis
- Verify the existence of an epidemic
- Rapid evaluation of epidemiologic potentialities
 - Common experience

Steps in the investigation of an epidemic)

■ Collection of data

- Define criteria of selection and classification
- Identification of affected persons and their characteristics
- Search for additional cases
- Identification of a common experience shared only by the case
- Study of the environmental conditions at the time of the outbreak and comparison with previous conditions

Steps in the investigation of an epidemic)

■ Analysis of data

- Time

date of onset , Epidemic curve

common-source epidemic

Propagated-source epidemic

point of exposure

period of exposure

Steps in the investigation of an epidemic)

- Analysis of data

- Place

- Spot map , Clustering of cases

- Attack rate by area

Steps in the investigation of an epidemic)

■ Analysis of data

- Person

Age – sex specific attack rate

Occupation

Formulation of hypothesis

- common-source epidemic or propagated-source epidemic
- Source of infection
- Method of transmission

common vehicle-borne transmission

Testing of hypotheses

1. Comparison of exposure among cases and non-cases
2. Comparison of attack rates among exposure and non-exposure groups
3. Experimental verification of agent of disease and mode of spread

Pathogenic mechanisms

- Direct tissue invasion (i.e. parasitic diseases, viral infections)
- Toxin production (i.e. tetanus)
- Immunologic enhancement or allergic reaction leading to damage to the host (i.e. allergic reactions to fungi in hay or mold)
- Chronic or latent infection (i.e. salmonella, hepatitis B)
- Enhancement of host susceptibility to drugs of otherwise minimal toxicity (i.e. Reye's syndrome)
- Immune suppression (i.e. AIDS)

Mechanisms of transmission of infection

■ Direct transmission

Immediate transfers of the infectious agent from a host or reservoir to an appropriate entry point (i.e. kissing, sexual contact, sneezing and coughing onto mucus membrane of others, exposure of susceptible tissue to fungi, bacteria, parasites).

■ Indirect transmission

- Vehicle borne i.e. surgical instruments, toys, food, water, IV fluids.
- Vector borne i.e. infectious agent passed to the host by an arthropods.
- Airborne (droplet nuclei and dust) i.e. droplet nuclei are dried residue of droplets that have been coughed or sneezed into the air, have resulted from aerosolization of infectious materials in labs, etc.

Person-to-person spread of diseases

- Carriers: Infected persons who do not have apparent clinical disease, but are a potential source of infection to others.

Note: Persons with an inapparent infection may not be carriers.

i.e. Most persons with a positive TB tests are not infectious.

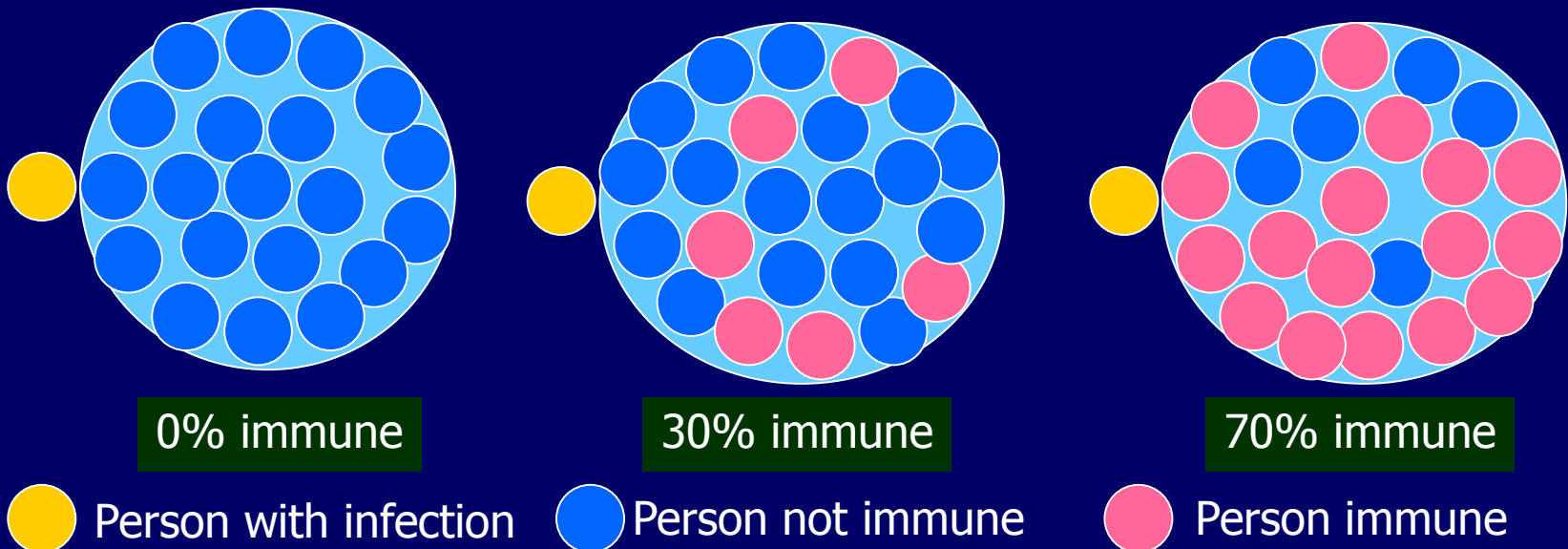
- Generation time: Time interval between cases; period between host's receipt of infection and maximal communicability.

Note: This time interval is not necessarily the same as the incubation period. Which is the time interval between the receipt of infection and the onset of disease.

Herd immunity

- Resistance of a group to invasion and spread of an infectious agent, based on the immunity of a high proportion of individual members of the group.

Note: In general, it is not necessary to achieve 100% immunity in a group to stop the epidemic.



Secondary attack “rates”

- Number of new cases during a specified time period among the members of the closed group (i.e. family) containing the index case(s) who are at risk.

Number of new cases in the group minus the initial case(s)

Number of susceptible persons in the group minus the initial case(s)

Investigating an epidemic

- Establish evidence of the epidemic
 - Verify diagnosis
 - Establish departure from normal incidence
- Orient the epidemic by time, place, and person
 - Chronological distribution
 - Environmental (geographical, social) distribution
 - Host (age, sex, occupation, immunity, food/water) distribution
- Calculate attack rates
- Investigate suspected sources

Management of epidemic

1. Treatment of case
2. Investigation of the population at risk and identification of carriers
3. Prevention and control measures

Report of the investigation

1. person, place, time
2. Agent , Source of infection , Method of transmission

Reference

- Annette Bachand, Introduction to Epidemiology: Colorado State University, Department of Environmental Health
- Leslie Gross Portney and Mary P. Watkins (2000). Foundations of Clinical Research: Applications to Practice. Prentice-Hall, Inc. New Jersey, USA