

Disease Detectives Tryout Test Key

Section 1: Background & Surveillance

1. Epidemic disease: sudden increase in number of cases of disease above what is expected in a geographic area. Ex. 37 cases of legionellosis occurred within 3 weeks among residents of a particular neighborhood, usually 0 or 1 per year
Hyperendemic disease: continuous high levels of disease occurrence in a geographical area. Ex. Average annual incidence was 304 cases of pulmonary tuberculosis per 100,000 population in one area, compared with national average of 134 cases per 100,000 population
Pandemic disease: epidemic that spreads across several countries or continents. Ex. Over 20 million people worldwide died from influenza in 1918–1919
Sporadic disease: occurs infrequently and irregularly. Ex. Single case of histoplasmosis was diagnosed in a community
Endemic disease: constant presence/usual prevalence of disease in a geographic area. Ex. About 60 cases of gonorrhea are usually reported in this region per week, slightly less than the national average
2. After the disease process has been triggered, pathological changes then occur without the individual being aware of them. This stage of subclinical disease, extending from the time of **exposure** to onset of disease symptoms, is usually called the **incubation period** for infectious diseases, and the **latency period** for chronic diseases. During this stage, disease is said to be **asymptomatic** (no symptoms) or inapparent. The onset of symptoms marks the transition from subclinical to **clinical** disease.
3. **Agent** leaves its **reservoir** through a **portal of exit**, is conveyed by some **mode of transmission**, and enters through an appropriate **portal of entry** to infect a **susceptible host**.
4. Zoonosis: An infectious disease that is transmissible from animals to humans
Fomite: a surface of object that a pathogen can survive on and then infect another host
Infectivity: the capacity to cause infection in host
Pathogenicity: the capacity to cause disease in host
Pandemic: An epidemic occurring over several countries or continents and affecting a large portion of the population
Sequelae: sequence of exposures leading to onset of disease
Enzootic: endemic in animal population
5. Timeliness, to implement effective control measures
Representation, to provide an accurate picture of the temporal trend of the disease
Sensitivity, to allow identification of individual persons with disease to facilitate treatment; quarantine, or other appropriate control measures
Specificity, to exclude persons not having disease
6. Direct contact: occurs through skin-to-skin contact, kissing, and sexual intercourse. Also refers to contact with soil or vegetation harboring infectious organisms.

Droplet spread refers to spray with relatively large, short-range aerosols produced by sneezing, coughing, or even talking.

Airborne: occurs when infectious agents are carried by dust or droplet nuclei suspended in air. Airborne dust includes material that has settled on surfaces and become resuspended by air currents as well as infectious particles blown from the soil by the wind. Droplet nuclei are dried residue of less than 5 microns in size.

Vehicleborne: may indirectly transmit an infectious agent include food, water, biologic products (blood), and fomites (inanimate objects such as handkerchiefs, bedding, or surgical scalpels).

Vectorborne: ex. mosquitoes, fleas, and ticks, may carry an infectious agent through purely mechanical means or may support growth or changes in the agent. Examples of mechanical transmission are flies carrying *Shigella* on their appendages and fleas carrying *Yersinia pestis*, the causative agent of plague, in their gut.

Section 2: Outbreak Investigation

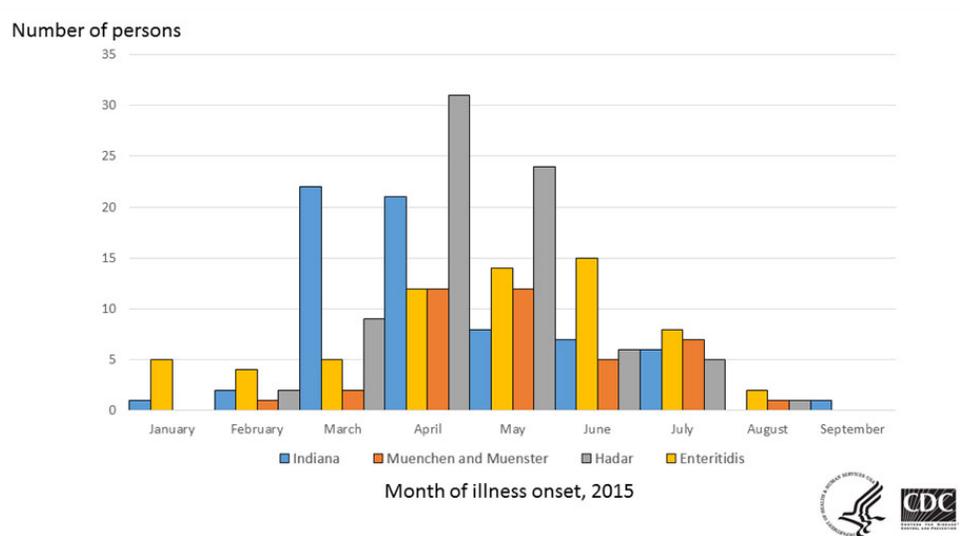
1. Agent, host, reservoir
2. Cross Sectional – Fastest, least expensive, least confidence, possible time-order confusion, cannot study rare diseases, useful for association between disease & characteristics (age, gender, ethnicity)
Case Control – compare people with disease with controls to find common exposures, can study rare, less expensive
Cohort – compare people with/without exposure, accurate, good measure of exposure, time consuming/expensive
3. Strength of Association – relationship is clear and risk is high
Consistency of Findings – observation of association must be repeatable
Specificity of Cause – a single cause produces a single effect
Alternatives for Hypothesis – multiple causes considered before making conclusions
Temporality – cause/exposure must precede the effect/outcome
Relationship of Dose- Response – an increase in exposure increases the risk
Plausibility of Association – agrees with currently accepted understanding of biological and pathological processes
Coherence and Compatibility – with existing theory and knowledge
Experimental Evidence – condition can be altered by an appropriate experimental process
Analogy - effect of similar factors considered
4. Self-selection bias: people selecting into groups do not do so evenly, sample is not representative of population
reporting bias: selective hiding or release of information by patients
information bias: interviewer knows intention of study, treats groups differently
nonresponse bias: public/embarrassing results are often suppressed
5. Type I error – incorrect rejection of true null hypothesis (false positive)
Type II error: - incorrect acceptance of fall null hypothesis (false negative)

- 6. Viral
- Bacterial
- Parasitic
- Bacterial

Section 3: Patterns, Control, and Prevention

1.

Persons infected with the outbreak strains of *Salmonella* Enteritidis, Hadar, Indiana, Muenchen, or Muenster, by month of illness onset*



*n=251 for whom information was available as of September 23, 2015. Some illness onset dates have been estimated from other reported information.

For y-axis, accept number of cases or number of persons.

2. Primary Prevention—intervening before health effects occur, through measures such as vaccinations, altering risky behaviors (poor eating habits, tobacco use), and banning substances known to be associated with a disease or health condition.
 Secondary Prevention—screening to identify diseases in the earliest stages, before the onset of signs and symptoms, through measures such as mammography and regular blood pressure testing.
 Tertiary Prevention—managing disease post diagnosis to slow or stop disease progression through measures such as chemotherapy, rehabilitation, and screening for complications.
 Award 1 point for identifying each level, 2 points for each explanation
3. The odds ratio is calculated as $(35/15) / (11/59)$, which equals 12.5.
4. The odds ratio is calculated as $(20/30) / (15/55)$, which equals 2.4
5. Strong correlation between injection drug use and Hepatitis A – odds ratio much higher than 1. Odds ratio for non-injection drug use and Hepatitis A still greater than 1, indicating that exposure to non-injection drug use could still affect Hepatitis A, however, the results may not be statistically significant (because of the small population size etc).

Section 4: Case study

Initial Case Definition

Patient 1: No, eosinophil count <2,000 cells/mm³

Patient 2: Yes

Patient 3: Yes

Patient 4: No, no greenish discoloration

Patient 5: Yes

Patient 6: No, eosinophil count <2,000 cells/mm³

Patient 7: No, other known cause of discoloration

Revised Case Definition

Patient 1: No, eosinophil count <1,000 cells/mm³

Patient 2: Yes

Patient 3: Yes

Patient 4: No, no greenish discoloration

Patient 5: Yes

Patient 6: No, greenish discoloration affects < 20% of skin surface

Patient 7: No, other known cause of discoloration