Slide 1

Epidemiology

Lecture 18

Slide 2

Learning Outcomes

- Terminology
- Modes of Disease Transmission
- Extent of Host Involvement
- Signs and Symptoms of Disease
- Stages of Disease
- Occurrence of Disease
- Severity of Disease

Slide 3

Definition of Terms

- Pathology — Study of disease
- Etiology — Study of the cause of a disease
- Pathogenesis — Development of disease
- Infection — Colonization of the body by pathogens
- Disease — An abnormal state in which the body is not functionally normally

Using your own words provide a definition of the term epidemiology.

Explain the difference between an infection and a disease.

Using your own words provide definitions of the following terms; etiology, pathology, and pathogen.

Slide 4

You and Your Microbiota

- Transient
- Normal
- Commensalism
- Mutualism
- Parasitism
- Pathogenic

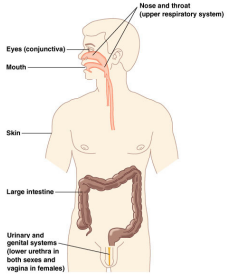
Provide an example of how your own microbiota protects you against potential pathogens.

What are commensal bacteria?

Slide 5

Locations of Microbiota

- Skin
  - Probionibacterium
  - Malassezia
- Eyes
  - Staph epidermidis
- Nose
  - *Staphylococcus aureus*,
- Throat
  - Strep pneumoniae, Haemophilus, Nesseria
- Mouth
  - Strep mutans, Actinomycetes
- Large Intestine
  - E.coli, Bacteroides,
- Vagina
  - lactobacilli, Candida, Trichomonas



Provide an example of how your own microbiota protects you against potential pathogens.

Slide 6

What Have you Done for Me Lately?

- Normal microbiota protect the host by:
  - occupying niches that pathogens might occupy
  - producing acids
  - producing bacteriocins
- Probiotics
  - live microbes applied to or ingested into the body, intended to exert a beneficial effect.

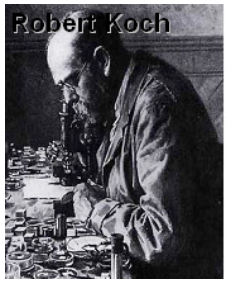
Provide an example of how your own microbiota protects you against potential pathogens.

What are probiotics and what is the medical purpose of using probiotics?

Slide 7

Robert Koch

- 1876
- Discovered anthrax causing bacterium
- Koch's Postulates

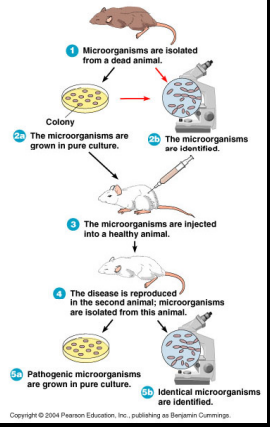


What was the major contribution that Robert Koch made to medicine?

Slide 8

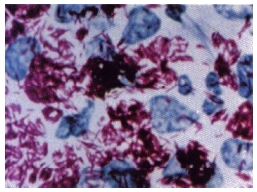
Koch's Postulates

- The same pathogen must be present in every case of the disease
- The pathogen must be isolated from the diseased host and grown in pure culture
- The pathogen from the pure culture must cause the disease when it is inoculated into a healthy, susceptible animal
- The pathogen must be isolated from the inoculated animal and must be shown to be the original organism



Slide 9

Exceptions to Koch's Postulates



- Organism can't be cultured
  - e.g. *Mycobacterium leprae*
- Combination of pathogens
- Ethical considerations

List three diseases that have been proven to be exceptions to Koch's postulates

Slide 10

Signs, Symptoms and Syndromes

- Sign
  - Objective
  - Measurable
  - Temperature
  - Swollen lymph nodes
- Symptom
  - Subjective Complaints
  - Aches
- Syndrome
  - Specific group of signs or symptoms
  - Always accompany a particular disease

Explain the difference between signs of a disease and symptoms of a disease.

Slide 11

Classification of Diseases

- Communicable
  - Spreads through population
  - Genital herpes, Typhoid Fever,
- Contagious
  - Spreads easily
  - Measles,
- Noncommunicable
  - Does not spread
  - Tetanus

Provide examples of communicable and non communicable bacterial diseases.

Slide 12

Occurrence of Disease

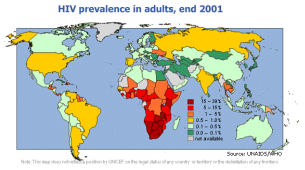
- Incidence
  - Number of people in a population develop the disease during a particular time period
  - = New cases
- Prevalence
  - Number of people in a population develop the disease at a specified time
  - = old and new cases
- Incidence of AIDS in US in 2004
  - 40,000
  - 40,000 cases in 2006
- Prevalence US 2004
  - 1 million
- approx 1 in 302 or 0.33%

Explain the difference between the incidence of a disease and the prevalence of a disease.

Slide 13

Occurrence of Disease

- Sporadic
  - Occasionally present
  - Typhoid
- Endemic
  - Constantly present in population
  - Common cold
- Epidemic
  - Many people acquire disease at same time
  - Cholera
- Pandemic
  - Disease present worldwide
  - Influenza
  - AIDS



Use examples of named disease to explain the difference between an endemic disease, and an epidemic disease.

Using your own words provide definitions of the following terms; endemic, epidemic, pandemic, and sporadic.

Slide 14

Severity and Duration

- Acute
  - Develops Rapidly generally last a short time
  - Influenza
  - SARS
- Chronic
  - Develops slowly
  - May recur
  - TB
- Subacute
  - Between Acute and Chronic
- Latent
  - Disease remains inactive
  - Shingles

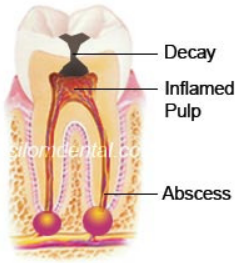
Use examples to explain the difference between an acute infection and a chronic infection.

Use examples to explain the difference between an inapparent infection, acute infection and a chronic infection.

Slide 15

Extent of Host Involvement

- Local
  - Pathogens limited to small area
- Systemic
  - Infection throughout the body
- Focal Infection
  - Site of original infection that spread to other areas
  - Endocarditis due to tooth decay
- Bacteremia
  - Presence of bacteria in blood
- Septicemia
  - Growth of bacteria in blood
- Toxemia
  - Toxins in blood
- Viremia
  - Viruses in blood



Explain the differences in terms of host involvement between a local infection, a focal infection and a systemic infection.

Provide definitions of the following terms; septicemia, toxemia, bacteremia.

Slide 16

Primary and Secondary Infections

- Primary
  - Often acute disease
  - Weakens immune system
  - Influenza A
- Secondary infection
  - May be an opportunistic pathogen
  - Commensal bacterium
  - *Haemophilus influenzae*

Use an example to demonstrate your understanding of the term opportunistic pathogen.

Explain the difference between a primary infection and a secondary infection.

Slide 17

Primary and Secondary Infections

- Toxemia — Toxins in the blood
- Viremia — Viruses in the blood
- Primary infection — Acute infection that causes the initial illness
- Secondary infection — Opportunistic infection after a primary (predisposing) infection
- Subclinical disease — No noticeable signs or symptoms (inapparent infection)

The bacterium Haemophilus influenzae was mistakenly identified as the causative agent of influenza (hence the name). It was, however, responsible for the often fatal pneumonias that developed in flu victims. Using this information how would you categorize Influenza virus A, and Haemophilus influenzae. [page 429]

Slide 18

Predisposing Factors

- Make the body more susceptible to disease
  - Short urethra in females
  - Inherited traits such as the cystic fibrosis
  - Climate and weather
  - Fatigue
  - Age
  - Lifestyle
  - Chemotherapy
  - Immunosuppressive drugs - corticosteroids

What are predisposing factors? Provide a factor which would predispose an individual to a particular infection.

Slide 19

- Incubation
- Prodromal
- Period of illness
- Period of decline
- Period of Convalescence

Stages of a Disease

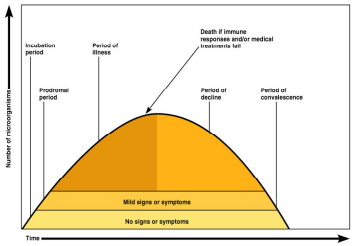
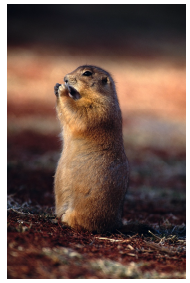


Diagram and describe the five stages of a disease.

Slide 20

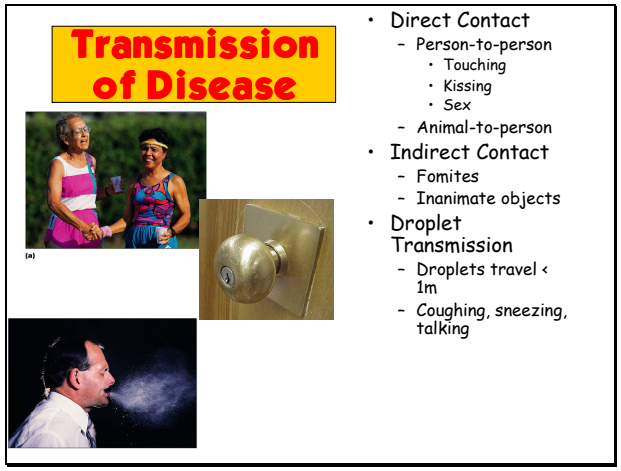
- Human
  - Respiratory diseases
  - STI's
  - May have inapparrent infection
- Animal
  - Zoonoses
  - Rabies
  - Tick borne diseases
  - Lyme
  - Plague
- Nonliving
  - Soil
  - Botulism
  - Tetanus

Reservoirs of Infection



What is a reservoir of infection? Provide named examples of diseases that have animal and non living reservoirs that allow them to be transmitted to humans periodically.

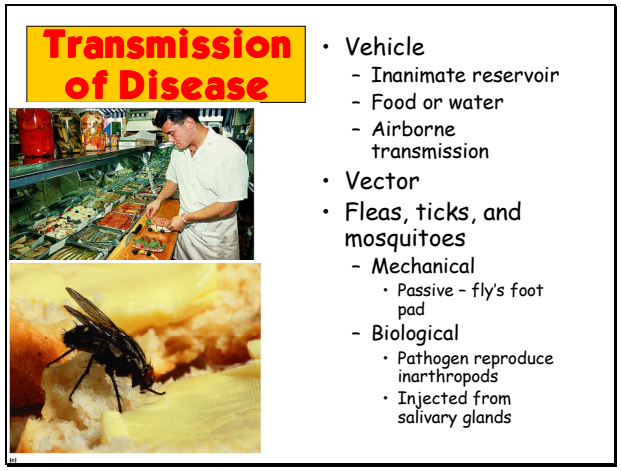
Slide 21



Explain the difference between droplet transmission and airborne transmission.

Describe the role of a fomite in the transmission of a Gastrointestinal virus (Stomach flu), at a day care center. What can be done to limit the spread of infections diseases by fomites?

Slide 22

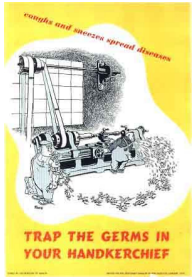


Explain the difference between vehicle transmission of a disease and vector transmission of a disease

Slide 23

Coughs and Sneezes Spread Diseases

- Public Health Campaign aimed at TB 1950's
- Respiratory tract
  - Coughing, sneezing

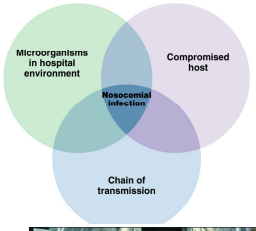


Coughs and Sneezes Spread Diseases; explain how, and from the microbes point of view why?

Slide 24

Nosocomial Infections

- Hospital Acquired
- 5-15% of all hospital patients acquire nosocomial infections

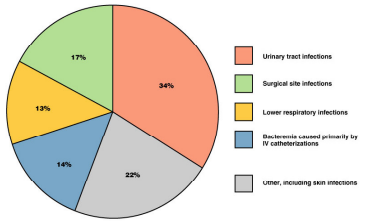


What is a nosocomial Infection?

What factors contribute to the transmission of nosocomial infections?

Slide 25

Relative frequency of Nosocomial infections



What factors contribute to the transmission of nosocomial infections.

Slide 26

The Usual Suspects

	Percentage of nosocomial infections	Percentage resistant to antibiotics
Gram + cocci	34%	28%-87%
Gram – rods	32%	3-34%
Clostridium difficile	17%	
Fungi	10%	

What factors contribute to the transmission of nosocomial infections.