

MICROBIOLOGY

CHAPTER 4

INFECTION AND BACTERIAL INVASIVENESS

4:1 Infectious Diseases

INFECTION: the invasion of the body by microorganisms

NOT ALL INFECTIONS CAUSE DISEASE.

e.g. – your body's normal flora

DISEASE: the interruption of normal body function

COMMUNICABLE DISEASE: disease transmitted from one individual to another

aka – contagious disease

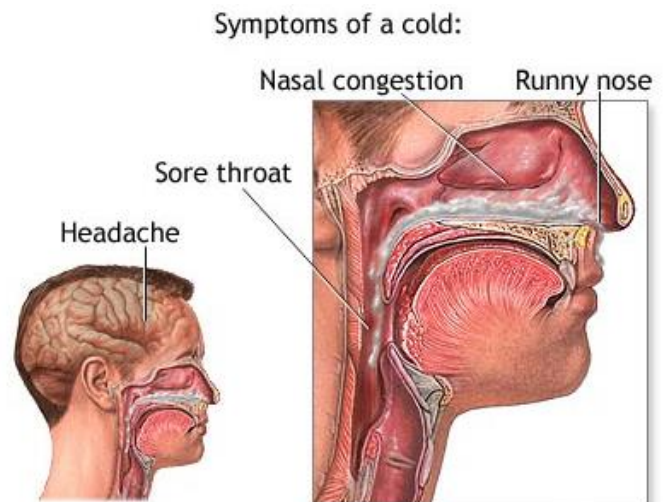
PATHOGENICITY: the ability of a microorganism to cause a disease

VIRULENCE: the degree of pathogenicity

Categorizing diseases by their rate of occurrence

1. ENDEMIC: a disease that is constantly present within a certain geographical area

e.g. colds

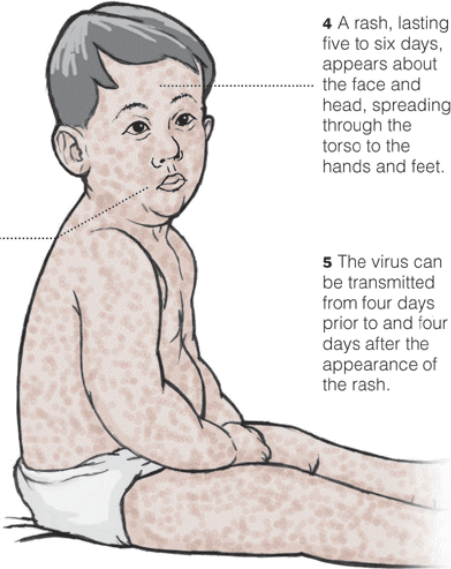


Characteristics of Measles

1 The virus is spread by breathing in virus-containing droplets or by touching contaminated surfaces.

2 The virus grows in cells in the back of the throat and lungs. Symptoms appear after 10 to 12 days.

3 Infected person has a fever lasting two to four days, followed by a cough, runny nose and red, watery eyes.

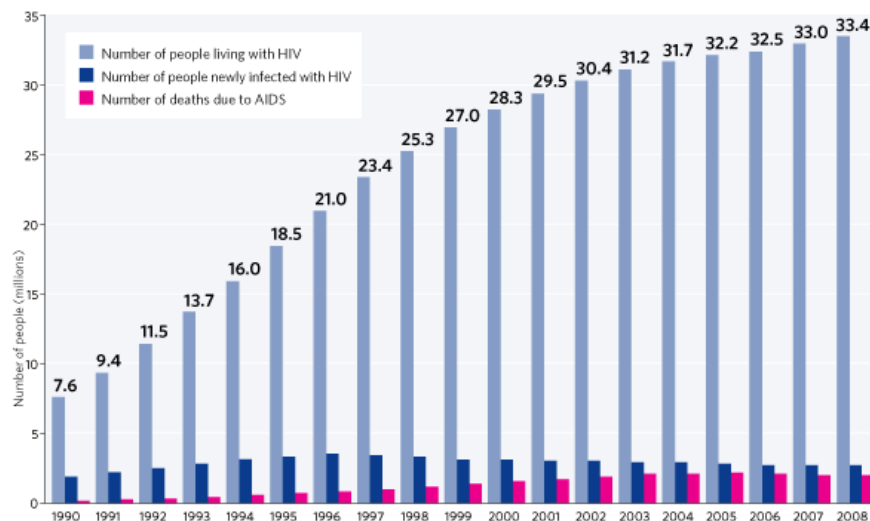


4 A rash, lasting five to six days, appears about the face and head, spreading through the torso to the hands and feet.

5 The virus can be transmitted from four days prior to and four days after the appearance of the rash.

2. **EPIDEMIC**: a disease occurring at greater than expected frequency
e.g. flu, measles

3. **PANDEMIC**: a disease that has reached epidemic proportions worldwide
e.g. AIDS



ABOUT 1 IN 4 NEW HIV INFECTIONS IS AMONG YOUTH AGES 13-24



MOST OF THEM DO NOT KNOW THEY ARE INFECTED, ARE NOT GETTING TREATED, AND CAN UNKNOWINGLY PASS THE VIRUS ON TO OTHERS

35 MILLION PEOPLE WORLDWIDE ARE CURRENTLY LIVING WITH HIV/AIDS.



>1 MILL ARE LIVING WITH HIV IN THE U.S.

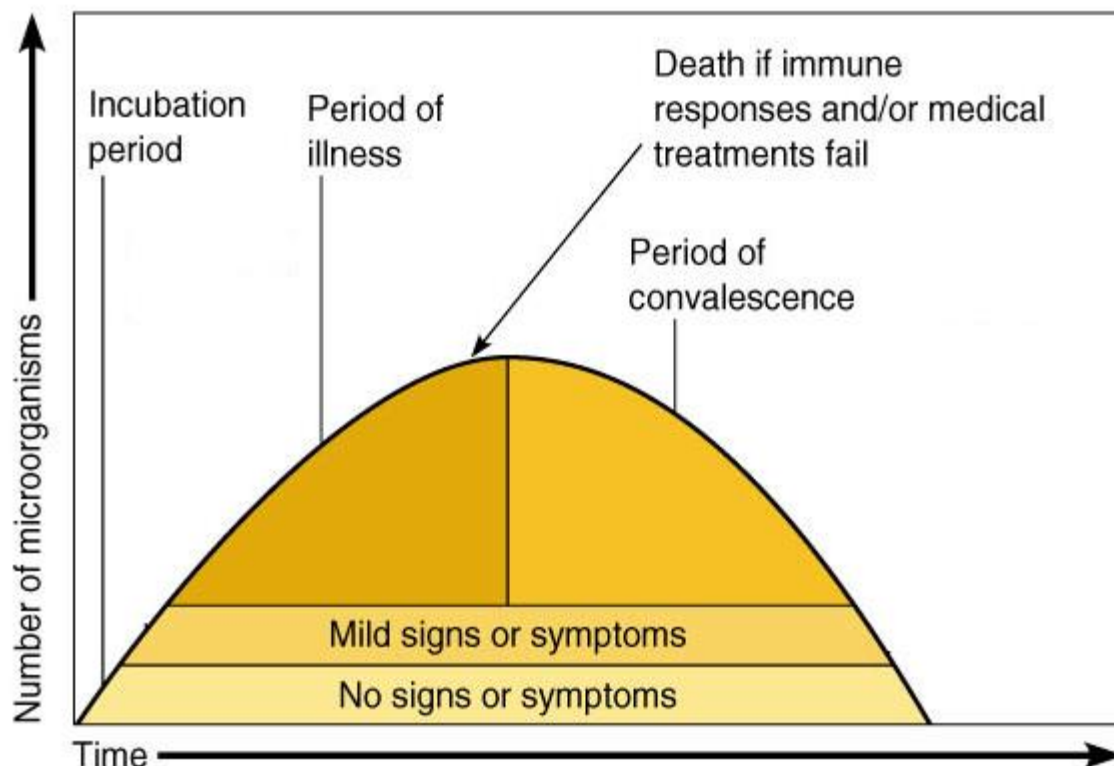
1 IN 8 LIVING WITH HIV ARE UNAWARE OF THEIR INFECTION



4. SPORADIC: a disease that occurs only occasionally
e.g. mononucleosis, ebola

Stages of a Communicable Disease

1. INCUBATION PERIOD: time interval between infection and first noticeable symptoms, varies by disease and may be predictable
2. ILLNESS: time interval during which disease symptoms are apparent
3. CONVALESCENCE: time interval during which disease symptoms decrease and body function returns to normal



4:2 Types of Infection

Acute vs. Chronic

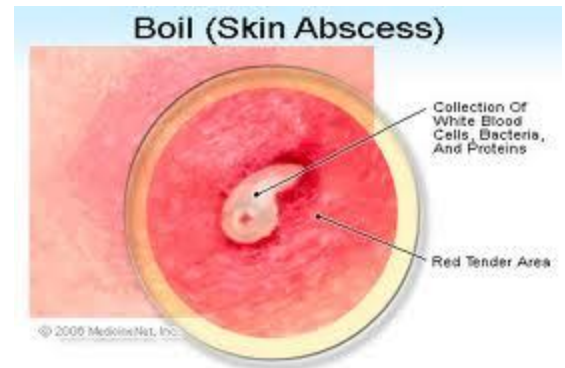
ACUTE INFECTION: infection that develops rapidly, is of short duration, and results in a high fever

CHRONIC INFECTION: infection that develops slowly, with mild but long lasting symptoms

Local vs. Systemic

LOCAL INFECTION: infection in which the causative microbe is limited to one locality in the body

e.g. boil, ear infection





SYSTEMIC INFECTION: infection in which the causative microbe spreads throughout the body

e.g. measles, Lyme disease

Primary vs. Secondary

PRIMARY INFECTION: initial infection causing the illness

SECONDARY INFECTION: infection caused by a microbe that is only able to invade the body after the primary infection or suppression of immune system has weakened the body's defenses

Microbes that cause primary infections must be INVASIVE; microbes that cause secondary infections are

OPPORTUNISTIC.

e.g. primary infection → AIDS
secondary infection →
Pneumocystis carinii pneumonia

INAPPARENT INFECTION: an illness in which the symptoms are absent or are so mild that it goes undetected and undiagnosed

Many illnesses are inapparent.

BACTEREMIA: the presence of bacteria in the blood

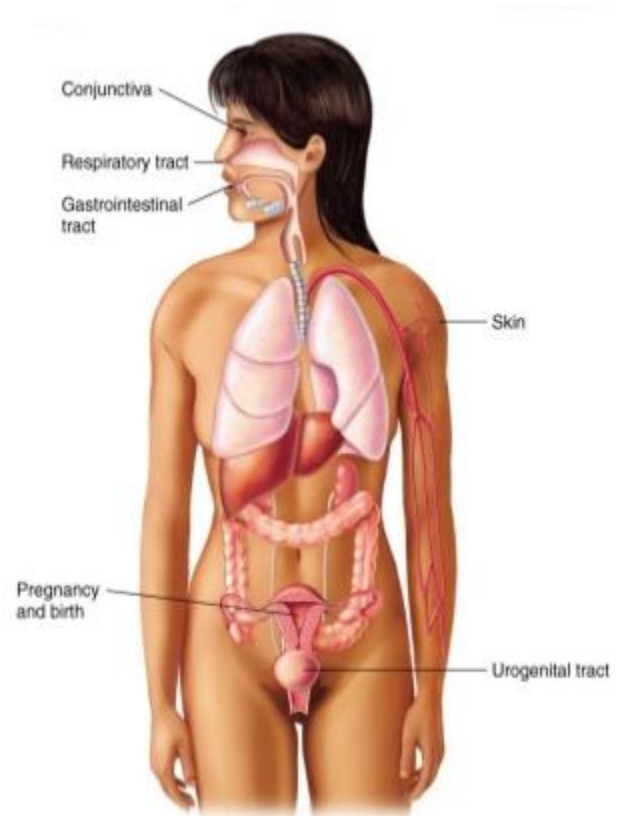
SEPTICEMIA (SEPSIS): when bacteria are multiplying in the bloodstream

4:3 How Pathogens Enter and Leave the Body

Each microorganism capable of producing a disease has its own portal(s) of entry as well as portal(s) of exit from the host.

Microbial Portals of Entry

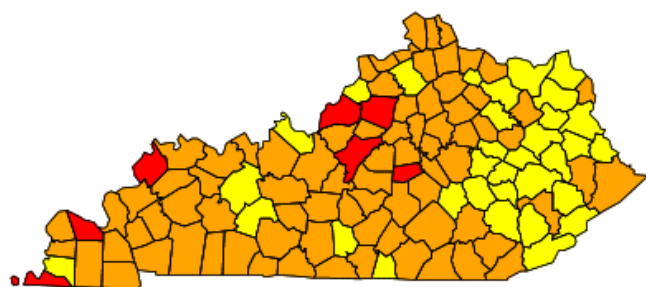
1. **Respiratory tract via nose and mouth** → cold, flu, measles, pneumonia, tuberculosis
2. **Gastrointestinal tract via mouth** → typhoid fever, dysentery, cholera, polio, hepatitis
3. **Skin and mucous membranes** → staph and strep skin infections, tularemia
4. **Blood** → malaria, bubonic plague, Lyme disease, viral encephalitis
5. **Genitourinary tract** → syphilis, herpes



PORTALS OF EXIT MAY BE THE SAME AS PORTALS OF ENTRY.

Rates of Reportable STDs among Young People 15 - 24 Years of Age Kentucky, 2013

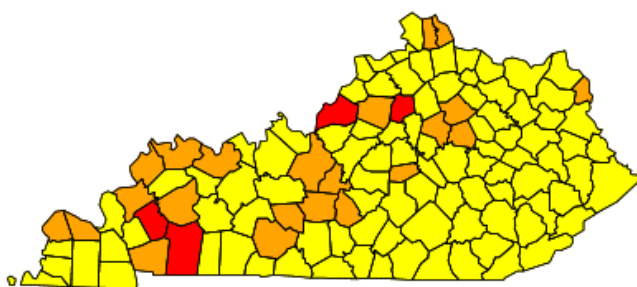
Chlamydia Rates by County



Rate (per 100,000 population)

≤1000.0	1000.1-3000.0
>3000.0	

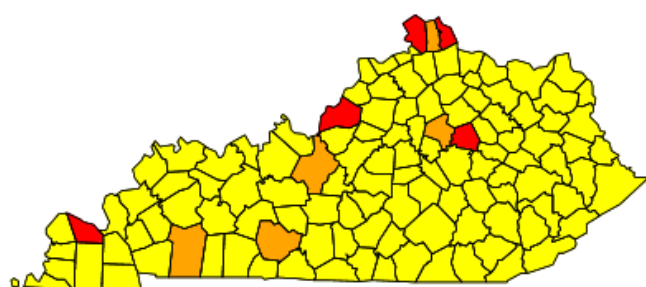
Gonorrhea Rates by County



Rate (per 100,000 population)

≤300.0	300.1-600.0
>600.0	

P&S Syphilis Rates by County



Rate (per 100,000 population)

≤2.2	2.21-10.0
>10.0	

Cases and Rates per 100,000

	Kentucky		U.S., excluding outlying areas	
	Cases	Rate	Cases	Rate
Chlamydia	12082	2037.9	949270	2160.2
Gonorrhea	2363	398.6	185127	421.3
P&S Syphilis	35	5.9	4542	10.3

Dec 2014

The **STATE**
of **STDs**
in the United States



in **2016**

STDs TIGHTEN THEIR GRIP
ON THE NATION'S HEALTH
AS RATES INCREASE FOR A
THIRD YEAR



1.59 million
CASES OF CHLAMYDIA
4.7% increase since 2015



468,514
CASES OF GONORRHEA
18.5% increase since 2015



27,814
CASES OF SYPHILIS
17.6% increase since 2015

LEARN MORE AT: www.cdc.gov/std/

4:4 Factors in the Development of a Disease

A disease agent's ability to cause a disease is determined by:

1. **Portal of Entry** → must allow pathogen to cause disease
2. **Ability to flourish outside the body** → some organisms survive longer than others
3. **Vector** → an agent that carries pathogen from one host to another
4. **Number of pathogens** → varies with type of pathogen and portal of entry

