

pathogen human microbiology forbidden germs worker epidemic hygiene ebola contagion bacteria health touch healthy genetic clinic microbe medicine virus disease science medical gloves scientific analysis protective biology sanitary spread isolation sickness endemic pandemic patient protection research experiment flow prevention microscopic flu doctor cell stop organic blood



Partnering for
Immunizations

BREAKING THE CHAIN OF INFECTION

Communicable Disease
and Infection Control

Place Your Logo Here
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OBJECTIVES

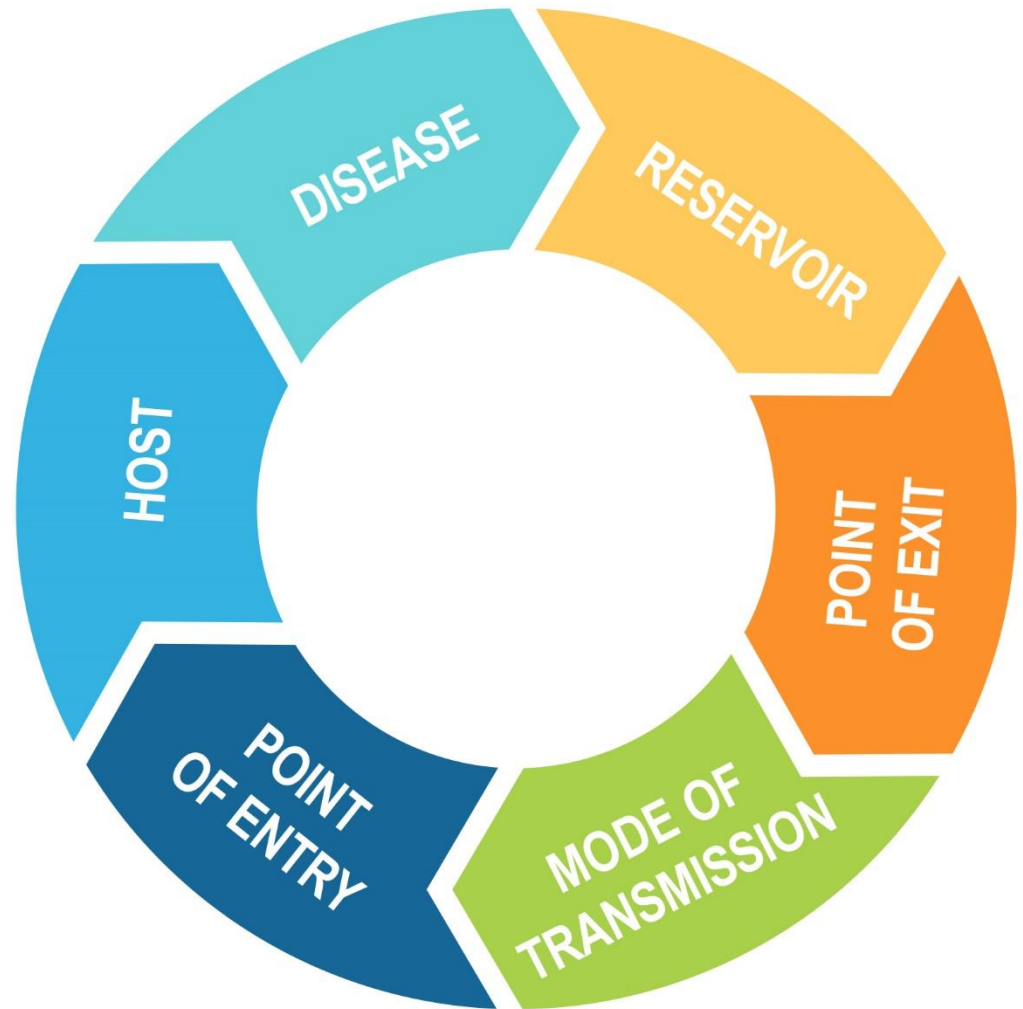
- Identify the 6 parts of the “chain of infection”
- Understand how vaccines and other prevention tools can reduce spread of disease
- Describe herd immunity and its importance to disease prevention

**Despite U.S. immunization
Program success, CDC officials
Confirm that outbreaks still occur.**

**In 2014, there were 23 outbreaks
and over 600 people with measles.**



What is the Chain of Infection?



- **Caused by growth of pathogens in the body**
- **Transmitted directly or indirectly from one person or item to another**



ASYMPTOMATIC CARRIER

Person infected with an infectious disease, and although they show no symptoms, can transmit it to others.

Some vaccine-preventable infectious diseases:

- Hepatitis B
- HPV

- **Bacteria: Single-celled organisms; reproduce inside and outside body (ex: Hib, Pertussis)**
- **Viruses: Intracellular parasites – depend on host to survive, reproduce inside a living cell (ex: Influenza, Common Cold, Measles, Chicken Pox)**



RESERVOIRS

Definition:

Source of infection; where a disease lives or grows

Examples:

- Humans
- Water
- Insects
- Animals (pets, bats, livestock)
- Food
- Feces

Humans are most common reservoir of pathogens that can infect themselves and others

POINT OF EXIT

Definition:

Path by which diseases leave reservoir

Examples:

- Blood
- Respiratory tract (sneezing, coughing, breathing or talking)
- Gastrointestinal tract
- Genitourinary tract

TRANSMISSION

Definition: How disease gets from reservoir to host

Contact:

- **Direct: Person-to-person (body surface to body surface)**
 - Disease example: HPV
- **Indirect: Object surface-to-person (contaminated handrail)**
- **Droplet: Coughing or sneezing**
 - Disease example: Meningococcus

TRANSMISSION

Non-Contact:

- **Airborne: Aerosols/particles in air**
 - Disease example: Chickenpox, measles
- **Vehicle: Contaminated source (food/water)**
 - Disease example: Hepatitis A
- **Vector-borne: Insect or animal vectors (mosquitos or ticks)**
 - Disease example: Malaria

POINT OF ENTRY

Definition:

Way disease gets into host's body

Any opening in body can be a way for diseases to enter host:

- Mucous membranes
- Digestive system
- Broken skin (including intentional invasive procedures)
- Respiratory system
- Genitourinary system

HOST (PERSON)

Definition:

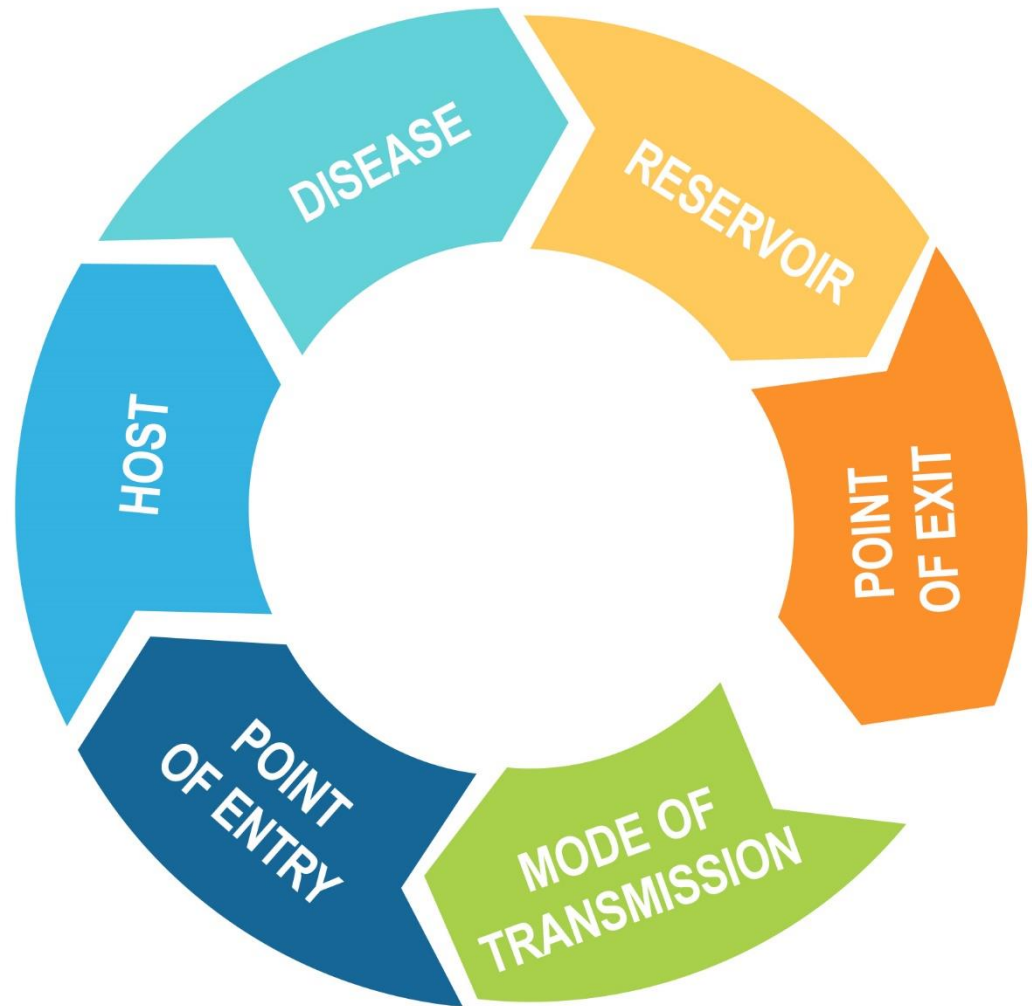
A person at risk of infection

Several factors affect chance of infection:

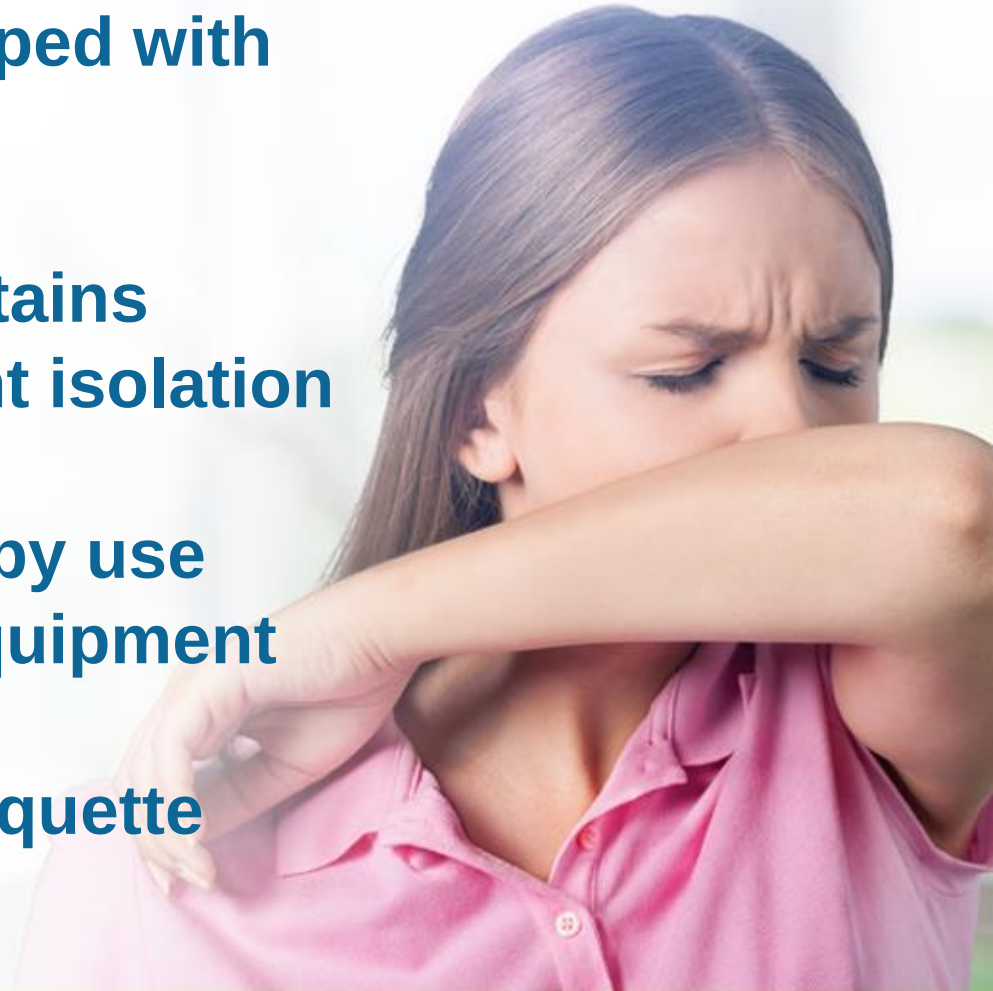
- Natural barriers to infection
- Immune system function
- Environmental factors
- Vaccination status

Disease	→	Mode of Transmission
Chickenpox (Varicella)	→	Airborne/person-to-person/droplet
Flu (Influenza)	→	Droplet
Hepatitis A	→	Fecal-oral
Hepatitis B	→	Bloodborne/sexual/surface
HPV	→	Person-to-person/sexual
Measles	→	Airborne
Mumps	→	Droplet
Polio	→	Fecal-oral

**Disease can
be prevented
by breaking
the chain of
infection at
any point**



- **Diseases:** Can be stopped with treatment/prevention
- **Reservoirs:** Host maintains personal health, patient isolation
- **Point of exit:** Stopped by use of proper protective equipment and proper hand hygiene/respiratory etiquette



- **Mode of transmission: Stopped through proper handwashing, disinfection, proper disposal of contaminated materials**
- **Point of entry: Stopped by disinfection and sterilization procedures**
- **Host: Broken when the health of individuals is maintained**



- **Immunizations – Patients, travelers, and healthcare workers (HCWs)**
- **Educate HCWs in appropriate preventive procedures:**
 - Early identification/reporting disease
 - Treatment and standard/universal precautions
 - Handwashing
 - Disinfection/sterilization
 - Patient isolation (when necessary)

HERD IMMUNITY

Definition:

Protection provided to non-immune individuals when a significant percentage of the population has immunity

REPRODUCTION NUMBER

Definition:

Average number of additional cases a single person infects in a population

Examples:

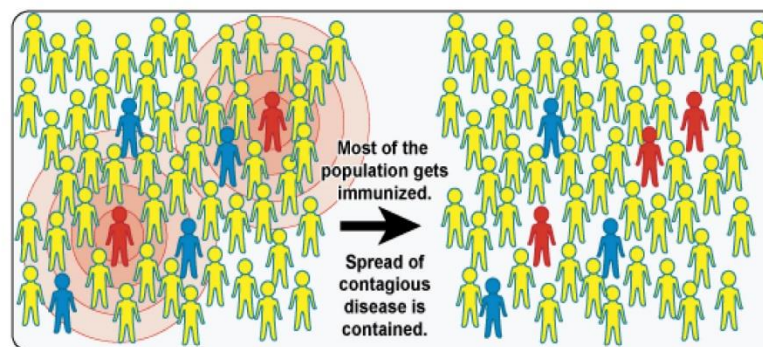
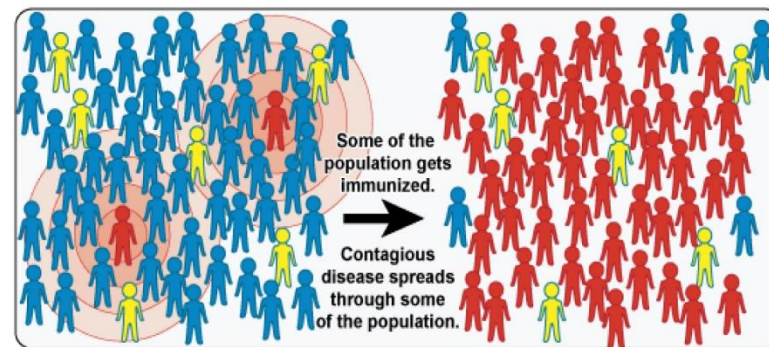
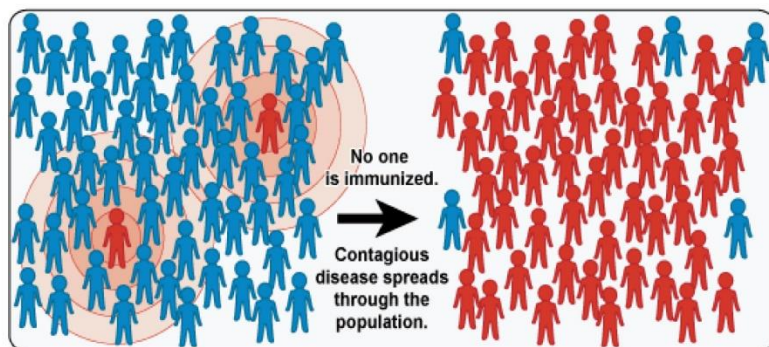
Disease	Reproduction Number
Measles	12-18
Pertussis	12-17
H1N1	1.4-1.6
Polio	5-7
Rubella	5-7
Mumps	4-7

When a large population of a community is immunized against a contagious disease...

- Most members will be protected from the disease
- Greatly reduces threat of outbreak
- Helps protect those who cannot be vaccinated:
 - Infants
 - Pregnant women
 - Immunocompromised persons

These people gain indirect protection because disease is contained

 = not immunized but still healthy  = immunized and healthy  = not immunized, sick, and contagious



Challenges:

- **Airborne**
- **Extremely infectious**
 - Avg. 12-18 secondary cases from one case
 - Requires high vaccination rate (83-94%)

Opportunities:

- **Vaccine is very effective and safe**

DISEASE IDENTIFICATION & REPORTING

- If you suspect or confirm infectious disease, contact your local health department ASAP!
- Confirm disease with lab testing whenever possible (free when done with health department approval)
- Enter lab-confirmed cases in MI Disease Surveillance System (MDSS)

HEY TAKE-AWAYS

- 1. Vaccines prevent outbreaks of disease and save lives**
- 2. Patients AND healthcare providers must be vaccinated.**
- 3. Early disease identification and reporting is crucial to stopping outbreaks**

Remember, breaking the chain of infection is the responsibility of each healthcare professional.



Questions/Comments?