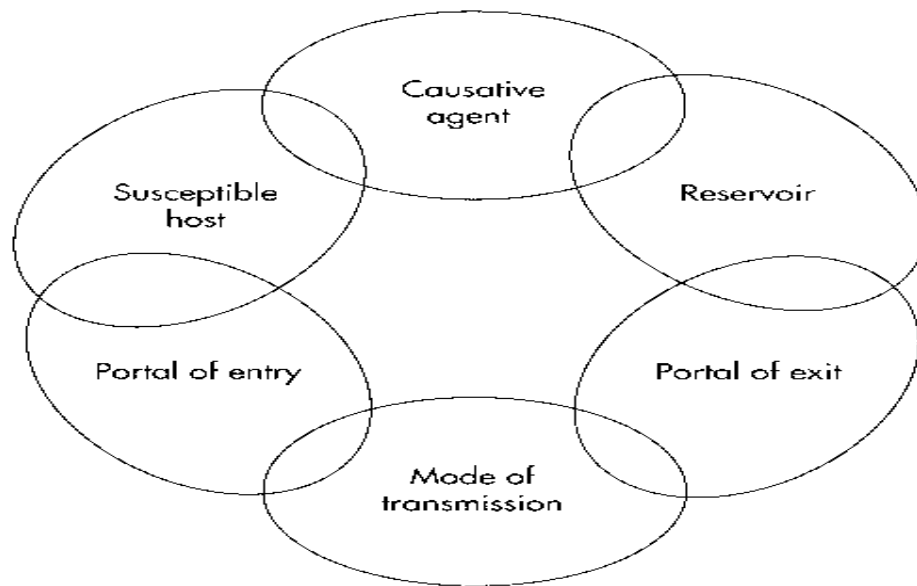




Chain of Infection

This overview of the chain of infection will describe the infectious disease process and will provide a foundation for reducing infection rates. If any one link is broken, then infections will not occur.



Causative Agent:

A causative agent is any biological, physical or chemical agent capable of causing disease. The ability to cause disease is influenced by the organism's specific characteristics: i.e. invasiveness, pathogenicity, virulence, infectious dose, viability in free state, host specificity, antigenic variation, its ability to develop resistance to antimicrobial agents.

Reservoir:

A reservoir is where the organism lives and multiplies and includes humans, animals and the environment. Human reservoirs can be further defined as:

- a. symptomatic - acute clinical cases of disease
- b. asymptomatic - infected but without symptoms
- c. carriers - organisms are present in the body for varying periods without symptoms.



Portal of exit:

For an organism to be transmitted from one person to another, it must exit the body of the reservoir. The key portals of exit relevant to human disease include:

- respiratory tract
- genitourinary tract
- gastrointestinal tract
- skin/mucous membranes
- transplacental
- blood

Modes of transmission:

The mechanism of transfer of an infectious agent from a reservoir to a susceptible host is called the mode of transmission. The major modes include: direct and indirect contact, droplet, airborne, common vehicle, vector-borne.

Portal of entry:

In order for organisms to infect a susceptible host, they must enter the host's body through a portal of entry. These portals are the same as the portals of exit.

Susceptible Host:

A person lacking effective resistance to a particular organism is susceptible to those organisms. Host characteristics that influence susceptibility to and severity of infection include:

- age
- gender
- ethnicity
- socioeconomic status
- marital status
- lifestyle
- nutritional status
- medications
- trauma
- natural antibodies
- disease history/ underlying disease
- heredity
- occupation
- diagnostic/therapeutic procedures
- pregnancy
- balance in body's normal flora
- natural barriers (i.e. intact skin, cilia cough mechanisms, gastric acid, etc.)



The following table summarizes the chain of infection and measures that will impact on the specific link to break the chain.

Link in Chain	Definition	Breaking Link	Specific Preventive Measures
Causative Agent	Biological, physical or chemical entity capable of causing disease	Knowledge of natural history and characteristics of agent and reservoir.	<ul style="list-style-type: none"> • identification of potential reservoirs • identification of practices that impact on exposure to agents
Reservoir	Place where an infectious agent can survive but may or may not multiply	Information about the causative agent, where it lives and the most effective way to eliminate it.	<ul style="list-style-type: none"> • housekeeping practices • food handling practices • cleaning/disinfection/sterilization • storage practices
Portal of Exit	The path by which an infectious agent leaves the reservoir	Knowledge of mode of transmission for the organisms and specific measures to prevent exit.	<p>Routine Practices:</p> <ul style="list-style-type: none"> • handwashing • gloves • masks • accommodations <p>Additional Precautions:</p> <ul style="list-style-type: none"> • contact • airborne • droplet <p>Other:</p> <ul style="list-style-type: none"> • skin care
Mode of Transmission	The mechanism for transfer of an infectious agent from a reservoir to a susceptible host	Barriers specific to the causative agent are utilized.	<p>Routine Practices:</p> <ul style="list-style-type: none"> • handwashing • gloves • masks • accommodation <p>Additional Precautions:</p> <ul style="list-style-type: none"> • contact • airborne • droplet <p>Other:</p> <ul style="list-style-type: none"> • equipment - cleaning, sharing practices • environmental control
Portal of Entry	The path by which an infectious agent enters the susceptible host.	Practices to reduce access to the portal of entry specific to the agent.	<p>Routine Practices:</p> <ul style="list-style-type: none"> • handwashing • gloves • masks • accommodation <p>Additional Precautions:</p> <ul style="list-style-type: none"> • contact • airborne • droplet <p>Other:</p> <ul style="list-style-type: none"> • equipment - cleaning, sharing practices • environmental control



<p>Susceptible Host</p>	<p>Individual lacking effective resistance to a particular pathogenic agent.</p>	<p>Knowledge of factors which increase susceptibility and implementing measures which reduce exposure.</p>	<ul style="list-style-type: none"> • appropriate immunization • appropriate use of antimicrobials <p>Routine Practices:</p> <ul style="list-style-type: none"> • handwashing • gloves • masks • accommodation <p>Additional Precautions:</p> <ul style="list-style-type: none"> • contact • airborne • droplet <p>Other:</p> <ul style="list-style-type: none"> • equipment - cleaning, sharing practices • environmental control
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Important Concepts:

1. Acquiring new organisms increases infection risk among hospitalized patients even though most people tolerate colonization with many organisms but rarely develop infection.
2. Any organism can cause infection under the correct circumstances.
3. When organisms are transferred from one patient to another, colonization rather than infection is generally the result.
4. Colonization is only detected if a microbiologic culture is taken - therefore, colonization is usually undetected.
5. Colonized persons can become a major reservoir and an important “link” in the infection cycle.

Definitions:

Colonization: Organisms are present (identified in microbiologic culture) but are not causing cellular damage in person

Alternate definition: The presence of microorganisms in or on a host with growth and multiplication but without tissue invasion or damage; no cellular injury.

Infection: Organisms are causing a cellular response in the person.

Alternate definition: *the entry and multiplication of an infectious agent in the tissues of the host.*

Contamination: The presence of microorganisms on inanimate objects or in substances.



References:

1. Infection Control and Applied Epidemiology: Principles and Practice. Association for Professionals in Infection Control and Epidemiology, Inc. (APIC) 1996.
2. Infection Control with Limited Resources.