Chapter 2: Summary of content

Chain of infection

How microorganisms spread

The chain of infection consists of six links and the healthcare worker's role (among others) is to prevent or stop the spread of infections by breaking the chain.

Causative agent

Examples of causative agents are bacteria, viruses, fungi, and protozoa. They are very common in our environment, and most of them are harmless or even essential for the human being. Patients are usually more likely to get an infection from virulent microorganisms due to underlying illness and/or other factors that have weakened the patient's immune system.

Reservoir

The second link in the chain is the reservoir, the place where the causative agents live and multiply. Humans are the most important reservoirs for HAIs; the nose may harbour bacteria and viruses (the MRSA-bacteria is often found here), the skin can carry fungi, and the gastrointestinal tract is a reservoir for many different types of organisms such as viruses, bacteria, bacterial spores, and parasites. The host can be asymptomatic and still transmit pathogens. There are also environmental reservoirs such as soiled linen, dirty gloves, environmental surfaces or improperly cleaned surgical instruments.

Portal of exit from the reservoir

The portal of exit is where the causative agent gets out of the reservoir. Body fluids and tissue from various body systems are common sources of infections.

Modes of transmission (See Table I)

In order for an organism to get from one person to another or from one place in the body to another, it must have a mechanism of getting there known as the mode of transmission.

A lot of effort is aimed at preventing the spread of microorganisms from the reservoir to the susceptible host. The single most important factor for preventing the spread of infection is compliance to hand hygiene strategies.

Portals of entry

The portal of entry is often the same as the portal of exit; this is where the causative agent enters the new host. Medical procedures such as IV catheters, surgical wounds, and intubation are examples that are present in the perioperative period.

Susceptible host – The patient

The final link in the chain of infection is the susceptible host. As mentioned earlier, some bacteria are harmless unless the immune system is weakened. Other factors that can change the outcome could be the presence of invasive devices such as catheters or the absence of natural barriers such as open wounds and burns.

Table I: Modes of transmission

Direct contact	
Physical contact with patient and body fluid, soil or vegetation, e.g. sexually transmitted diseases, blood-borne infections or direct contact with infected wounds	
Droplet spread	• Airway instrumentation such as intubation, suctioning and extubation • Sneezing, coughing, singing • Large particles > 5 µm • Due to the size of the particle, it usually only travels for a short distance usually less that one meter
Indirect contact	
Contact with contaminated environment, linen, hands, etc.	
Airborne/ aerosol spread	• Airway instrumentation such as intubation, suctioning and extubation • Particles < 5 µm • Remains suspended in air for prolonged periods • Spread over large area and possibly further than physical barriers such as rooms or operating theatres • Can be deposited on environmental surfaces
Vehicle spread	• Contaminated hands • Inanimate objects such as laryngoscopes, pens, cell phones
Vector spread	• Flies, mosquitoes