

# How to get infected – the chain of infection

To be infected a human needs to be contaminated and to develop an infection based on this contamination with **germs**. The ability to get an infection is based on the infection chain, which will be explain herein after. From outmost importance: if one of the elements of the infection chain is eliminated, the likelihood of an infection is very poor. W&H AIMS focusses on contaminated objects like instruments and materials and the way to disrupt the chain of infection by breaking the mode of transmission.

## Six elements of the infection chain:

### 1 The infectious agent – germs.

- a.** Are all germs infectious agents? First of all the microbe must show its ability to cause a disease. This ability is named as virulence. Virulence can be measured in degrees to which a germ causes infections. Could be different from germ to germ, here are some examples: Usually expressed as infectious dose 50 (**ID50**)
- i.** Tuberculosis = 1 bacillus
  - ii.** Syphilis = 57 bacteria (ID50)
  - iii.** E. coli 0157 = <10 cfu
  - iv.** Influenza virus = <10 (Tissue culture ID50)

### 2 The reservoir or where germs live:

- a.** Microbes are ubiquitous in nature. Most pathogenic microbes that infect humans come from other humans, some human pathogens come from animals (zoonoses) e.g. anthrax or corona viruses, some human pathogens originate from the environment e.g. Clostridium tetani spores in soil. Last but not least: fomites  
are also to be found on contaminated objects or surfaces.

**3****The portal of exit or how germs get out:**

- a.** Microbes must leave the source to colonize a new host.  
The mechanism of escape vary depending upon the source.

**Mode of escape may be:**

- i.** natural (e.g. coughing or sneezing)
- ii.** artificial (e.g. blood donation or dental aerosol generating procedures)

**b. How microbes leave the body:**

- i.** tears, nasal excretion, saliva, blood in saliva, respiratory fluids and sputum, contact with the skin breast milk, faeces, intestinal fluids, blood and tissue fluids exiting through small breaks in the skin or thorough injuries, semen, vaginal secretes, urin.
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**4****The mode of transmission or how germs get around:**

- a.** You can distinguish two modes of transmission.

- i.** Direct transmission: e.g. direct contact with soil, inoculation into skin or mucosa, droplets
  - ii.** Indirect transmission: e.g. unclean hands and fingers, inoculation by contaminated instruments, sprays or splashes from e.g. dental aerosols, syringe, fomite born, airborne.
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**5****The portal of entry or how germs get in:**

- a.** The germs can enter the body via: mouth, eyes, skin abrasions, mucous membranes (digestive system, respiratory system, urine tract, sexual organs)
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**6****The susceptible host or next sick person**

- a.** People with a weakened immune system, children, babies, elderly, unimmunized people and unvaccinated people

**Additional information** to the element “the reservoir” of the infection chain:

### Incubation period:

The time between contamination and the development of symptoms is called incubation period. For different germs, the incubation period is different.

**Table 1: Incubation periods for various diseases,**  
adapted from Volgenant (1)

INCUBATION PERIOD FOR VARIOUS DISEASES	
Disease	Incubation period
Hepatitis A	15–40 days
Hepatitis B	30–180 days
Hepatitis C	30–150 days
Hepatitis D	21–90 days
Influenza	1–3 days
Mumps	12–26 days
Gonorrhoea	2–9 days
Measles	about 11 days
Chickenpox	10–21 days

### Asymptomatic carriers:

An infected person with no clinical evidence of disease, though signs and symptoms of the disease may have been evident earlier. Most of these carriers are not aware of the infectious state. A good example is the spread of HIV, most of the people who were infectious were not aware about their infection.

In case the person shows the presence of micro-organism, with growth and multiplication, but without any overt clinical expression (infection) at the time the micro-organism is isolated the host is regarded as a colonised but not infected person. This is often the case of the Methacillin-resistant *Staphylococcus aureus* (MRSA) infection.

#### Bibliography:

- (1) Volgenant, C.M.C., de Soet, J.J. Cross-transmission in the Dental Office: Does This Make You Ill?. *Curr Oral Health Rep* 5, 221–228 (2018).  
<https://doi.org/10.1007/s40496-018-0201-3>