Health Protection Factsheet

Issue 4

Infection prevention and control: What is it?

Infection prevention and control measures aim to ensure the protection of those who might be vulnerable to acquiring an infection both in the general community and while receiving care due to health problems, in a range of settings. The basic principle of infection prevention and control is hygiene. (WHO statement)

What is a healthcare associated infection (HCAI)?

HCAIs are infections that happen because of healthcare interventions. There are several factors that can increase the risk of getting an infection, but having high hygiene standards minimises the risk.

Infections that are routinely monitored are:

- Bacteraemia (blood stream infections) caused by *Staphylococcus aureus* - both meticillin-resistant *Staphylococcus aureus* (MRSA) and meticillin-sensitive *Staphylococcus aureus* (MSSA)
- *E.coli* and glycopeptide-resistant enterococcus(GRE)
- *Clostridium difficile* infection (C. diff/CDI),
- Surgical site infections (of which some orthopaedic categories are mandatory), monitored via the surgical site infection surveillance scheme (SSISS).

(Source: HPA)

What is Microbiology?

Microbiology deals with diseases caused by infectious agents such as bacteria, viruses, fungi and parasites. Microbiologists work in laboratories and directly in patient care, across a range of activities including:

- basic laboratory science
- direct patient care
- public health
- infection control
- research and teaching
- business management

What is a micro-organism?

Micro-organisms are very tiny living things. They are so small that you need a microscope to see them. Micro-organisms are all around us, in the air, in our bodies and in water. Some micro-organisms are harmful to us, but others are helpful to us.

Micro-organisms that cause diseases are often called germs
There are three types of micro-organism:

- viruses
- bacteria
- fungi

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Some diseases, like chickenpox, are caused by **viruses,** and these are usually spread easily from one person to another.

Uncooked foods (especially meat) can contain **bacteria**. Bacteria are killed when food is cooked properly, but if you eat food that hasn't, the bacteria may survive and make you feel very ill. If you don't brush your teeth properly, bacteria can cause tooth decay or an infection.

Mould is a type of **fungus** that grows on decaying food. It can make you ill if you eat it.

Some micro-organisms are useful, for example:

When bread is made, micro-organisms called yeast are added to the dough to make the bread rise.

Yoghurt is made by boiling milk and adding special bacteria to it. The bacteria turn the sugar in the milk into acid. The acid makes the milk go thick and stops any harmful bacteria growing.

Inside a pile of dead leaves are millions of tiny bacteria. These bacteria feed on the leaves and break them down into nutrients**.** The nutrients go back into the soil where they can be used by plants.

What is a pathogenic micro-organism?

A pathogenic organism ('pathogen') is an organism capable of causing disease in its host. Pathogens are micro-organisms - such as bacteria and viruses - that cause disease. Bacteria release toxins, and viruses damage our cells. White blood cells can ingest and destroy pathogens by producing antibodies that destroy the infectious micro-organisms, and antitoxins to neutralise toxins created as a by-product.

Pathogens: bacteria

Bacteria and viruses are the main types of pathogen. Bacteria come in many shapes and sizes, but even the largest are only 10 micrometres long - that's 10 millionths of a metre.

Bacteria are living cells and, in favourable conditions, can multiply rapidly. Once inside the body, they release poisons or toxins that make us feel ill. Diseases caused by bacteria include:

- food poisoning
- cholera
- typhoid
- whooping cough

How are micro-organisms transmitted?

Micro-organisms can be passed on in two main ways: **direct** contact and **indirect** contact.

Direct contact

Direct contact means that the disease-causing microbe is passed from one person to another when their bodies touch in some way.

- **Vertical transmission** happens when micro-organisms pass from a mother to her unborn baby through the placenta. German measles and HIV can be passed on this way.
- **Horizontal transmission** happens when micro-organisms pass from one person to another by touching, kissing or sexual intercourse.
  Examples of horizontal transmission:

Type of contact	Bacterial disease	Viral disease
touching	bacterial gastroenteritis	chickenpox
kissing	bacterial meningitis	glandular fever, cold sores
sexual intercourse	gonorrhoea, syphilis	HIV, hepatitis B

Indirect contact

Indirect contact happens when micro-organisms are carried to a person in some way, instead of by actual body to body contact.

- **Vehicle-borne transmission** involves an object carrying the disease-causing microorganism. Examples of vehicle-borne transmission:

Vehicle	Bacterial disease	Viral disease
droplets in the air	tuberculosis (TB)	colds, flu
water	cholera	polio
sharp objects	tetanus	HIV
food	Salmonella food poisoning	hepatitis A

- **Vector-borne transmission** involves an animal such as an insect. For example, malaria is transmitted by mosquitoes, dysentery by houseflies and plague by fleas.

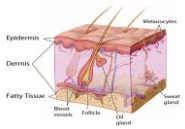
Body defences

Most pathogens have to get inside our body to spread infection. Once they are inside, the body provides ideal living conditions, including plenty of food, water and warmth. Standing in their way is our body's immune system - the body's co-ordinated response to the invading pathogens.

The first line of defence is the body's natural barriers. These include:

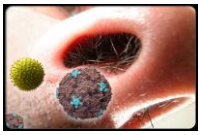
- skin
- nasal hairs, mucous and *cilia*
- tears
- stomach acid - it destroys the protein structure of the bacteria's enzymes. This results in the bacteria being unable to carry out its bodily processes

The skin



The skin covers the whole body, protecting against physical damage, microbe infection and dehydration. Its dry, dead outer cells are difficult for microbes to penetrate, and the sebaceous glands produce oils that help kill microbes.

Nasal hairs, mucous and cilia



The respiratory system is protected in several ways. Nasal hairs keep out dust and larger micro-organisms. Sticky mucous traps dust and microbes, which are then carried away by cilia (tiny hairs on the cells that line the respiratory tract).

Tears

Tears, saliva and mucous contain an enzyme called lysozyme. This destroys micro-organisms.

Stomach acid

The stomach contains hydrochloric acid, which destroys micro-organisms.