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# Protection

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## Introduction

With the current global Influenza A (H1N1 – 2009) pandemic, the escalating number of Tubercle Bacillus – TB patients within Singapore, and the shadow of nightmare of the Severe Acute Respiratory Syndrome (SARS – 2003), we should relook into the details so as to remind us of the basics and enhance our protection as a lifesaver.

## Disease transmission

A pathogen, infectious agent, or germ, is a biological agent that causes disease or illness to its host (person).

Types of pathogen are:

1. Viral (E.g.: Influenza, Hepatitis, Human Immunodeficiency Virus – HIV...)
2. Bacterial (E.g.: Tuberculosis – TB, Tetanus...)
3. Fungal.

Disease transmission is a process that begins when pathogens enter our body. While our body has mechanisms to defend ourselves from illness, sometimes these defenses can be overcome.

Our skin is the first defense our body uses to fight off germs. But the skin cannot protect us completely. Once pathogens enter our body, white blood cells identify these germs and release antibodies to fight the infection. In most cases, this is enough to ward off illness. But this is never for all cases.

## Factors for diseases to transmit

In order for a disease to be transmitted, these four factors must occur:

1. **Pathogen:** Must be present.
2. **Quantity:** Enough pathogen must be present to cause infection.
3. **Susceptibility:** Individual must be susceptible to the pathogen.
4. **Entry site:** Pathogen must enter a site that facilitates transport.

**If any one of these four conditions is absent, disease transmission CANNOT occur.**

In another word, if there are no germs or not enough germs, no illness results. If a healthy individual is not receptive to the germs or the germ entry site is blocked, the disease will be prevented.

### How diseases transmit?

Diseases can be transmitted via one of four ways:

1. **Direct contact.**
2. **Indirect contact.**
3. **Airborne transmission.**
4. **Vector transmission.**

Although our skin is an excellent barrier, we should avoid direct contact with blood and other body fluids from infected individuals. Indirect contact occurs when we touch objects that have been in contact or touched the blood and body fluids of an infected individual.

Examples of indirect contact include touching equipment like scissors and tweezers, soiled dressing, clothing, protective gloves and needles. Of particular concern with indirect contact are sharp objects since they may easily pierce the skin – always use caution around sharp objects that have been in contact with ill or injured patients.

Airborne transmission of diseases is common and occurs when we breathe in droplets from an infected person – try to avoid close contact with persons who are sneezing and coughing.

Vector transmission happens when a disease carrying insect infects a person through a bite in the skin. Malaria, carried by mosquitoes, is a significant concern too.

### Prevention

Although there are a number of factors to consider in order to prevent disease transmission, it is relatively simple to eliminate or minimize our risks and prevent infection. Remember to eliminate one of the four conditions for disease transmission (pathogen, quantity, susceptibility or entry site) and a disease cannot occur.

The easiest way to prevent disease transmission is to remove the entry site of the pathogen. This can be done by using universal precautions, which include wearing **Personal Protective Equipment (PPE)** like gloves, gowns, eye shields, and mouth-to-mask barriers.

Since we may not know the health status of the people we are with, it is best to be cautious and use as many PPE that are available based on the type of illness and or injury we may face.

Regardless of the perceived risk for disease transmission, we should follow these safe practices and precautions every time we come to the aid of another person.

Another way of minimizing the risk of disease transmission is to practice **Good Hygiene**. Wash our hands frequently, vigorously and for at least 10 to 20 seconds with antibacterial soap or other approved agent or use antiseptic washcloths.

To prevent cross contamination via equipment, we need to adhere closely to the recommended procedure in order to remove the pathogen, or at least reduce its quantity.

### Decontamination of equipment

Decontamination of manikin parts and oxygen delivery equipment must be carried out according to the recommendations of the manufacturer or the responsible authority, including a list of chemicals that are effective and compatible with the particular piece of equipment.

Some general rules for cleaning equipment are:

1. Discard any disposable parts.
2. Disassemble the equipment as appropriate.
3. Pre-rinse the appropriate parts with cold running water.
4. Wash appropriate parts thoroughly in warm water with a detergent that is compatible with the materials and carefully scrub with a soft brush.
5. Rinse the parts thoroughly in clean fresh water and then dry them.
6. Immerse the parts in the sterilizing solution for the required time.
7. Rinse the parts thoroughly in clean fresh water.
8. Dry all parts thoroughly.
9. Re-assemble the equipment and test it to ensure it operates correctly.

One suitable disinfectant solution is **70% alcohol (ethanol C<sub>2</sub>H<sub>5</sub>OH or industrial methylated spirit) and chlorhexidine C<sub>22</sub>H<sub>30</sub>Cl<sub>2</sub>N<sub>10</sub> (0.5%)**. Although highly bactericidal, alcohols alone are not considered broad spectrum agents. Also, proper contact times for effective action are not easy to achieve as alcohols evaporate rapidly. One minute immersion in such a solution may be sufficient, provided the equipment has been thoroughly pre-cleaned to remove organic material prior to disinfection. It is recommended primarily as an aid in mechanical cleaning. In the context of vigorous cleaning with alcohol and absorbent materials, little viable microbial contamination of any kind is likely to remain after the cleaning procedure.

Another disinfectant is a bleach solution with **sodium hypochlorite (NaClO) at a concentration of at least 500 ppm (parts per million)**. This is considered an appropriate broad spectrum disinfectant for clean surfaces. A suitable solution can be made by mixing 60ml of liquid household bleach per 4 litres of tap water. Ten minutes submersion has been recommended. The surface should be thoroughly pre-cleaned to remove organic (and other) material since hypochlorite is substantially inactivated in the presence of blood. The solution must be freshly made – which means prepared within 24 hours of use. The disinfectant solution must be discarded after use.

### Conclusion

Remember, before we initiate care to an ill or injured victim, do take a quick moment to assess the risks of disease transmission too, and use appropriate precautions like gloves and mouth-to-mask barriers. Not only are we protecting ourselves from disease when we do this, we are also protecting the injured victim from any germs to which we may have been exposed to.

Good patient care at the scene of an incident requires us to assure our own safety first and then safety of the injured victim.