Airborne Transmitted Diseases

**Situation:**

*With the media publishing more and more reports on Tuberculosis and other airborne diseases, what is their relevance in terms of environmental surface cleaning and disinfection? This document will help you to better understand the basic infection control principles of controlling the transmission of Airborne Transmitted Diseases such as Tuberculosis, Chickenpox, and Measles.*

**Background:**

Airborne transmission is the dissemination (spread) of microorganisms by aerosolization. Organisms that are airborne, are small particles that result from the evaporation of large droplets or in dust particles containing skin squames (dead skin cells) and other debris that remain suspended in the air for long periods of time. These microorganisms can be widely dispersed by air currents and inhaled by a susceptible host. Control of airborne transmission is the most difficult because it requires the control of airflow through special ventilation systems.

Patients in hospital or long term care facilities with an airborne transmitted disease must have their own room and keep the doors and windows closed. The room must also be a negative pressure room, which means the room has negative pressure in comparison to the hallway thus resulting in inward directional airflow so when the door is opened the air from the hallway comes into the room, but the air in the room does not go out into the hallway, because pressure flows from an area of high pressure to low pressure. A minimum of 6 air exchanges per hour must occur. As well, anyone entering the room (nurse, doctor, environmental services, visitor etc) must wear the appropriate Personal Protective Equipment such as a mask that filters particles one micron in size and have a 95% filter efficiency and provide a tight facial seal with less than 10% leak, most commonly known as an N95 mask.

**Tuberculosis:**

Tuberculosis (TB) is an infectious disease that can attack any part of the body, but the lungs are the most common target. TB is an infection caused by a bacterium called *Mycobacterium tuberculosis*. It is an airborne transmitted disease that is spread when a person with active, untreated TB germs in their lungs or throat cough or sneeze, and send their germs into the air. To catch TB you need to breathe the germs into your lungs by having close contact and heavy exposure, such as sharing a bed, being coughed on, or being in a small confined space with the person who has active disease. TB has not been shown to spread via contact with environmental surfaces. Symptoms of TB can be a cough that hangs on, fever, weight loss, night sweats, constant tiredness or a loss of appetite. TB can be cured with a strict 6-12 month antibiotic treatment. If a patient is not medication compliant then they are at risk of developing an antibiotic resistance to TB medication, therefore it is imperative to finish the full course of the treatment. In addition it is also a public health concern when someone is not medication compliant or refuses treatment because of the risk it poses to the community.
There is also a form of TB that is inactive – latent TB. This means that the TB germs are in the body, but are inactive which means the TB is lying dormant. The person is infected, but not sick. Most times people don’t even know they are infected. The inactive state is not harmful; the germs cause no damage and cannot spread to other people. Untreated inactive TB can become active when a person’s immune system is weakened i.e. HIV, aging, serious illness etc. When the immune system is weakened the inactive TB germs can become active, and they begin multiplying and damage the lungs or other organs. Once diagnosed, these cases can start on treatment to cure the TB. People who are diagnosed with inactive TB by means of a TB skin test (TST) or chest x-ray have the option to seek medical treatment and undergo the course of antibiotics to kill the dormant bacteria and avoid active disease in later life.

**Chickenpox:**

Chickenpox is an infectious disease caused by the varicella-zoster virus, an enveloped virus, which results in a blister-like rash, itching, tiredness and fever. The rash usually appears first on the trunk and face, but can spread over the entire body. Chickenpox spreads from person to person by either airborne transmission by coughing or sneezing, by direct contact with fluid from broken chickenpox blisters and to a lesser extent by indirect transmission via contacting contaminated fomites. A person with chickenpox is contagious 1-4 days before the rash appears and up to 5 days after the onset of the rash. The incubation period is 10-21 days, which means it takes 10-21 days after coming in contact with an infected person for someone to develop chickenpox.

**Measles:**

Measles, an enveloped virus, also called rubeola, is a highly communicable, febrile viral illness. Measles is an airborne transmitted disease that infects people when they breathe in the droplets that contain the measles virus or by contact with fluids from the nose or throat of an infected person both by direct and indirect means. Measles is very contagious and can be contracted by simply breathing the air in a room where an infected person has been. Measles symptoms often appear in two stages. The first stage begins with a runny nose, cough and a slight fever. As the infection progresses, the person’s eyes become red and sensitive to light, and fever will continue to rise. The second stage begins after 3-7 days and the fever can reach 39.4°C-40.6°C and a red blotchy rash will begin to appear. The rash usually starts on the face and then continues to spread to the chest, arms, back and legs. The rash can last for 4-7 days, as well white spots might also appear on the gums and inside of the cheeks.

**Prevention and Control of Airborne Transmitted Diseases using Disinfectants:**

Routine cleaning and disinfection of a patient’s surroundings should be done daily to reduce soil load such as sputum and viscid (sticky) substances, and help prevent secondary complications. This is important in a room with a patient diagnosed with chickenpox or measles because of the secondary complications that can develop from an infected blister such as Group A Strep, which could lead to Necrotizing Fasciitis (flesh eating disease). If proper cleaning and disinfecting of these facilities is not adhered to, then the occupants are at risk of developing secondary infections. Although the primary route of transmission of both chickenpox and measles is airborne both viruses are classified as enveloped or easy to kill viruses. Cleaning and disinfection using a highly effective cleaner and virucide
such as Accelerated Hydrogen Peroxide will ensure that the environmental surfaces are free of bacteria that could cause secondary complications as well as inactivating any virus that may be present.

With regards to Tuberculosis, it is a common misconception that a disinfectant product that carries a Tuberculocidal claim must be used. As discussed earlier, the only route of transmission of Tuberculosis is by inhalation of airborne organisms. If these infectious particles land on fomites such as linen, furniture, tables, floors or other environmental surfaces they are not considered a significant infection hazard in accordance with the Health Canada Guideline for Preventing the Transmission of Tuberculosis in Canadian Health Care Facilities and Other Institutional Settings (April 1996). Additionally, the section of the above mentioned guideline titled “Cleaning of Rooms & Equipment (page 26) indicates that only routine housekeeping procedures are needed for cleaning of walls, floors and other surfaces not associated with transmission of infection. Special germicidal agents or extraordinary cleaning procedures are not required. Cleaning and disinfection of fomites do not require any specific precautions apart from general good housekeeping and hygiene.

**What is the relevance of a Tuberculocidal claim?**

Tuberculocidal products are generally not required for routine housekeeping; however, there can be several reasons why a facility may request a disinfectant product that carries a Tuberculocidal claim. Products with a Tuberculocidal claim are considered to be Intermediate Level Disinfectants, therefore, provide a higher degree of care and confidence with regards to disinfection especially if combined with a General Virucide Claim. Intermediate Level Disinfectants can be used to disinfect some semi-critical items such as glass or electronic thermometers and can also be used for disinfection in areas that require a higher degree of care such as Dialysis Units, Burn Units, Laboratories or Dental Offices. Products with a Tuberculocidal claims are also required for disinfection of patient care rooms at facilities that provide BCG (Bacillus Calmette-Guerin, an inactivated form of Mycobacteria tuberculosis) therapy to patients with bladder cancer.

**Use of AHP in the Control of Airborne Transmitted Diseases:**

The exceptional disinfection properties of Accelerated Hydrogen Peroxide (AHP) will help to kill bacteria or viruses that could cause secondary complications such as MRSA or VRE infections etc. Also, as a superior cleaning technology it ensures that soils and other debris is removed from surfaces. AHP carries Broad-Spectrum Sanitizing claims against Vegetative bacteria, Bactericidal claims for Gram Negative and Gram Positive bacteria, and General Virucidal claims against enveloped and non-enveloped viruses. Additionally, there are AHP products that carry Fungicidal claims Tuberculocidal claims.
In Summary:

- A product with a TB claim is recommended for greater degree of care areas including TB isolation or other isolation, or any higher risk area where the greatest degree of care is desired, and the broadest spectrum of efficacy is preferred. Users should also consider the virucidal efficacy of the products they use - not just the TB claim.

- Accelerated Hydrogen Peroxide surface cleaner and disinfectants used for routine cleaning and disinfection carry sanitizing claims, Bactericidal claims and Broad-Spectrum Virucide claims and can also carry Fungicidal and Tuberculocidal claims.

- Routine cleaning and disinfecting of environmental surfaces will help control the risk of secondary infections, such as MRSA, VRE infections, Accelerated Hydrogen Peroxide is a highly effective cleaner and disinfectant.

- Tuberculosis, Chickenpox and Measles are the most well known diseases transmitted through the air.

- Chickenpox and Measles are caused by easy to kill, enveloped viruses that are readily inactivated by Accelerated Hydrogen Peroxide and other common Hospital Grade disinfectants.

- Tuberculosis is caused by *Mycobacterium tuberculosis* which is not transmitted by touching contaminated surfaces and therefore is not controlled by surface disinfectants.

References

www.lung.ca/tb

Department of Health and Human Services Centers for Disease Control and Prevention
www.cdc.gov/nip/diseases/varicella

Health Canada Guidelines for Preventing the Transmission of Tuberculosis in Canadian Health Care Facilities and Other Institutional Settings, April 1996