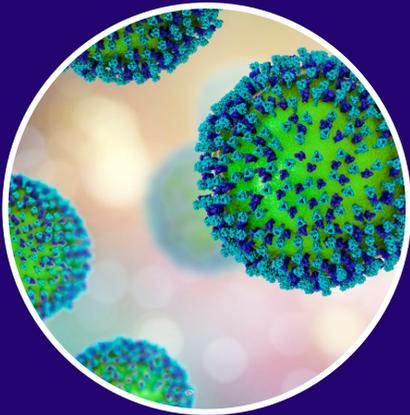




Re-emerging Microbial Threat: Measles



Measles virus



Measles is so contagious that if one person has it, up to 90% of the people around the infected person will also become infected if not immunized! - CDC ²



Did you know measles transmission is seasonal, typically peaking in spring for temperate climates and after the rainy season in the tropics? - WHO ²³



WHAT IS MEASLES?

Measles, a highly contagious viral disease, remains an important cause of death among young children globally²¹. It is caused by a morbillivirus of the paramyxovirus family¹⁰. Measles is an airborne infection that is spread by droplets from coughing or sneezing, close personal contact, or direct contact with nasal or throat secretions²².

Measles symptoms which usually appear 10–12 days after infection, include the onset of fever, aches and pains (malaise), head cold, conjunctivitis (red eyes), tiny white spots on the inside of the mouth and a cough^{10, 21}. Soon after, a characteristic skin rash of tiny red spots breaks out that starts at the head and gradually spreads downward to the rest of the body²¹. Other complications associated with measles include pneumonia, ear infection, diarrhoea, convulsions, encephalitis (an infection that causes brain swelling) and death^{10, 21}. Anyone can get measles if they have not been vaccinated or have not had it before, although it is most common in young children¹⁸. According to the World Health Organisation (WHO) in 2018, there were more than 140,000 measles deaths worldwide mostly among young children under the age of five²¹.

WHAT IS THE IMPACT OF MEASLES?

Globally, measles associated fatalities decreased by 84% over a 16 year period, from 550,100 deaths in 2000 to 89,780 in 2016²². However, in recent years there has been a sharp rise in measles outbreaks worldwide straining health care systems, and leading to serious illness, disability, and deaths^{24, 25}. 413,308 confirmed cases had been reported to WHO as of 5th November 2019²⁴. Although the largest outbreaks of measles are seen in countries with low measles vaccination coverage, leaving large numbers of people vulnerable to the disease, there have been outbreaks in countries with high national vaccination rates²³. To date, there have been almost three times as many cases reported compared to the same time in 2018²³. **A record breaking, 364,808 cases have already been reported for the first seven months of 2019 in 182 countries which exceeds the recorded 129,239 cases in 181 countries for the whole of 2018^{4, 23}.**

WHY IS IT A MICROBIAL THREAT?

Measles is one of the most highly communicable infectious diseases caused by a virus^{2, 11}. It spreads through the air when an infected person coughs or sneezes². Measles can be transmitted by an infected person from four days before and after the onset of the rash²¹. Spending more than 15 minutes in direct contact with someone infected with measles is enough to transmit virus¹¹. In fact, the measles virus can stay in the air for up to two hours after an infected person was there^{2, 21}. **As a result, it is possible to get infected by simply being in a room where an infected person once was⁴.**

Measles is still endemic in many developing countries such as various parts of Africa and Asia^{20, 21, 22}. There is growing concern over its re-emergence as a serious global public health threat especially as in the first six-months of 2019, measles cases are at the highest they have been in any year since 2006^{20, 21, 22, 23}. Outbreaks are occurring even in highly developed countries that had achieved, or were close to achieving, measles elimination, despite easier access to the vaccine, where public health infrastructure and health literacy are not significant issues^{20, 23}. **This includes the UK, Albania, Greece and Czechia who have lost their ‘measles free’ status and the United States which has the highest reported measles cases in 25 years^{3, 7, 23}.**

Reasons for no vaccination vary significantly between communities and countries²³. This could be attributed to vaccine hesitancy as a result of the now-debunked notion that measles vaccine caused autism – a false claim that unfavourably influenced measles, mumps and rubella (MMR) vaccination choices²⁰. Another reason could be that very few current parents had direct involvement with measles and are unaware about its infection, morbidity, and mortality rates²⁰. As a result, they have no experience with the repercussions of getting measles and associated complications and therefore feel no urgency to respond by immunising their children^{20, 23}. This could have contributed to the increase of susceptible people who have missed out on the vaccine when they were younger, leading to measles infections that can easily spread causing outbreaks, serious health related illnesses and deaths^{9, 20, 23}. Countries experiencing or recovering from a natural disaster or conflict are susceptible to measles outbreaks²¹. This could be due to damage to the health infrastructure and health services which interrupts routine immunisation and overcrowding in residential camps greatly increasing the risk of infection²¹.

WHO REGION	COUNTRY	MEASLES REPORTED CASES
EUROPE	UKRAINE	56802
	KAZAKHSTAN	10126
	UNITED KINGDOM	823
	FRANCE	2700
	ITALY	1054
	RUSSIAN FEDERATION	3521
THE AMERICAS	UNITED STATES	1276
	COLUMBIA	215
	BRAZIL	11887
	VENEZUELA	520
SOUTH EAST ASIA	BANGLADESH	4181
	MYANMAR	5286
	THAILAND	4852
WESTERN PACIFIC	PHILIPPINES	2900
	TONGA	310
	SAMOA	4217
	NEW ZEALAND	2144
	CAMBODIA	490
AFRICA	DEMOCRATIC REPUBLIC OF CONGO	250270
	MADAGASCAR	127000*
	GUINEA	1091/4690*
	NIGERIA	38000*
EASTERN MEDITERRANEAN	LEBANON	1060
	YEMEN	5847
	SUDAN	3659
	SOMALIA	5847

Table 1. Some of the confirmed measles cases reported worldwide as of November 2019.

*Suspected cases.

Disclaimer: Measles outbreaks are ongoing situations with data constantly being updated and subject to change.

References: CDC, 2019 c; ECDC, 2019; Europe WHO 2019 b; and PAHO-WHO 2019; WHO 2019 d

CAN MEASLES CAUSE IMMUNE AMNESIA?

It has been universally accepted that once infected, the person develops lifelong immunity¹⁵. However, according to Mina et al (2019), measles has a devastating impact on the body's immune system and resets the immune system to a "baby-like" state triggering immune amnesia¹⁴. This reset compromises the body's ability to fight infections for years by:

- Limiting the body's ability to devise new ways for fighting off infections¹⁴.
- Destroying memory B-cells –a type of immune cell that remembers previous infections resulting in a quicker immune response, enabling the body to forget how to fight infections it once knew how to beat¹⁴.

This immune amnesia response limits the range of antibodies to work with¹⁴. While not every antibody plays a crucial role in day to day activities, the deletion of a vital antibody such as one that might completely neutralise a microscopic intruder can be fatal, as without it the body may be vulnerable to infection once again¹⁴.

Mina et al (2015) analysed data since the start of mass vaccination in countries where measles was common and found mortality data that suggests measles disables immune memory for up to three years¹³. They concluded that vaccination not only safeguards children against measles it also prevents other infections taking advantage of measles immune amnesia damage¹³.

WHO IS AT RISK?

Measles can be serious in all age groups. However, complications of measles are more likely to develop in certain groups of people^{16,11}.

- Immunosuppressed individuals
- Babies younger than one year old
- Children with a poor diet
- Pregnant women

Non-immunised pregnant women infected with measles are at risk of the following¹⁶:

- Miscarriage or stillbirth
- Premature delivery
- Having a low birth weight baby

HOW CAN MEASLES BE TACKLED?

According to WHO^{21, 22} despite the measles vaccine being available, safe, effective and inexpensive for use since the 1960s, measles outbreaks are still ongoing due to:

- Inability to access to quality healthcare or vaccination services leading to older children, youth and adults missing out on vaccinations
- Conflict and displacement
- Misinformation about vaccines
- Low public awareness about the need to vaccinate

The WHO intends for routine measles vaccination for children, combined with mass immunisation campaigns in countries with low routine coverage to be key public health strategies to reduce global measles deaths²¹. The WHO aims to help countries stop measles outbreaks by strengthening the global laboratory network in order to ensure the timely diagnosis and tracking of the international spread of this vaccine-preventable disease^{21, 25}. This is to allow for a more harmonised country approach in targeting vaccination activities and reducing measles deaths globally²¹. Currently, the WHO has mobilised technical, financial and human resources needed to support the affected countries in tackling the ongoing circulation of measles worldwide⁷.



“As long as measles is a threat anywhere, it is a threat everywhere!” - CDC¹



DIAGNOSED WITH MEASLES? HERE ARE SOME TIPS ON REDUCING THE RISK OF SPREADING THE INFECTION:

- REGULARLY DISINFECT FREQUENTLY TOUCHED SURFACES AND OBJECTS⁴.
- ENSURE TO AVOID WORK OR SCHOOL FOR AT LEAST FOUR DAYS FROM WHEN YOU FIRST DEVELOPED THE MEASLES RASH¹⁷.
- ATTEMPT TO AVOID CONTACT WITH PEOPLE WHO ARE MORE VULNERABLE TO THE INFECTION, SUCH AS YOUNG CHILDREN, PREGNANT WOMEN AND IMMUNOCOMPROMISED PERSONS¹⁷.
- ENCOURAGE OTHERS THAT COME INTO CONTACT TO USE RESPIRATORY PROTECTION CONSISTENT WITH AIRBORNE INFECTION CONTROL PRECAUTIONS⁴.
- EMPLOY GOOD HAND HYGIENE AND COUGH ETIQUETTE⁴.

PREVENTION AND INFECTION CONTROL MEASURES

To avoid contracting measles, people are encouraged to have the MMR vaccine. Alternatively, the human normal immunoglobulin (HNIG) can be used if the MMR vaccine is unsuitable for use and persons are at an immediate risk of catching measles¹⁷. It is important to ensure measles vaccinations are up to date if traveling especially in areas that have ongoing measles outbreaks or it is endemic²³.

Microorganisms can enter through openings in the body (e.g. noses and mouths) and are able to be transmitted through non-intact skin and insect or animal bites¹². Preventing pathogens from entering the body is the most successful way of stopping infections¹². Following good personal hygiene habits is the first line of defence when preventing infection before it begins and avoiding spreading it to others¹². Targeted disinfection of surfaces such as high touch areas, with visible contamination or in rooms where infected or colonized persons were treated or nursed is an important step in managing an outbreak⁸. Disinfection provides microbicidal or irreversible inactivation of pathogens to an extent which prevents subsequent transmissions of infection⁸.

The emergence of life-threatening infections highlights the crucial requirement for well-organized infection control practices²⁶. Failure in implementing infection control measures favours the spread of pathogens²⁶. Health-care environments can act as amplifiers of disease during outbreaks, impacting both hospital and community health²⁶. The importance of adhering to infection control procedure is vital as every advance and investment in health care is weakened by breaches in infection control²⁶.

Tristel chlorine dioxide-based products offer a full spectrum of efficacy including efficacy against viral strains. Tristel chlorine dioxide-based products are virucidal in accordance with the required European Norm (EN) test standards stipulated in EN 14885:2018. Tristel products such as JET, DUEL, SHOT and Tristel Duo have been tested and are proven effective against viral strains such as Poliovirus Type 1, Adenovirus Type 5 and Murine norovirus. These organisms are the most resistant, as a result it is acceptable to claim virucidal efficacy against measles.

Overall, while vaccination is the most preventative measure against the spread of measles²¹, to assist with the containment during outbreaks virucidal products such as Tristel chlorine dioxide high-level disinfectants should be used for the decontamination of surfaces. Tristel chlorine dioxide products with virucidal activity are effective against the most resistant viruses.



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