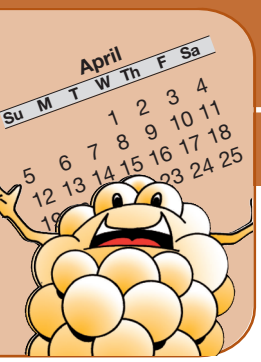


Measles: Are You Vaccinated?

Ahn P. Nguyen, MPH, MD and John M. Embil, MD, FRCPC

Measles, caused by the rubeola virus, is the most contagious infection of humans; however, it is vaccine-preventable. Prior to the widespread use of the measles vaccine, measles was a common problem worldwide, being a major cause of death in children. The complications associated with measles, including pneumonia, dehydration, malnutrition and secondary infections were the reason for its high mortality. Although controlled in North America, measles still causes significant morbidity and mortality in developing nations. It is for this reason that the measles is our **Bug of the Month**.

What is measles?

Measles is an acute contagious disease caused by the rubeola virus, a paramyxovirus belonging to the genus morbillivirus. The measles virus is an enveloped RNA virus that can be inactivated by heat and light. It has a short survival time of less than two hours in air or on surfaces. The incubation period is eight to 14 days and is followed by a catarrhal phase of approximately two to four days. In this phase, patients will show symptoms of fever, cough, coryza and/or conjunctivitis. Furthermore, generalized lymphadenopathy may occur and Koplik spots (enanthem) occur on the buccal mucosa and are considered pathognomonic for measles. These can occur up to two days before or two days after the onset of the disseminated maculopapular eruption.

The Koplik spots are punctate blue-white lesions on a erythematous background. The exanthematous stage starts with a maculopapular rash that begins at the hairline and then progresses to the face and upper neck. During the ensuing 48 to 72 hours, the eruption progresses downwards and outwards towards the hands and feet. Initially, the maculopapular lesions are discreet but will become confluent with time. Desquamation can occur on the more severely affected areas. The eruption resolves in the same order in which it began, specifically, from the head to the extremities.

Measles is a systemic infection, with the primary site of infection being the respiratory epithelium of the nasopharynx. The associated secondary viremia occurs five to seven days after exposure and it may attack the entire respiratory tract and other organs which can lead to a number of other manifestations.

What are the complications?

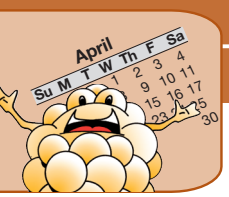
The major complications of measles are shown in Table 1. One or more complications are observed in approximately 30% of reported cases. Complications are more serious and occur more frequently among children < 5 years of age and adults over the age of 20. Some of the major complications include:

- Measles and pregnancy: mothers who develop measles during pregnancy have a higher risk of premature labour, spontaneous abortion and low birth weight. However, there have been no congenital abnormalities observed.
- Diarrhea: is the most common complication
- Otitis media: occurs exclusively in children.
- Pneumonia: This post-viral complication is often caused by *Staphylococcus aureus*, but tuberculosis or gram-negative microorganisms may also cause pneumonia in under nourished children and is the most common cause

Table 1

Complications associated with measles

Manifestation	Frequency
Diarrhea	8% of cases
Otitis media	7% of cases
Pneumonia	6% of cases
Seizure (with or without fever)	0.7% of cases
Encephalitis	0.1% of cases
Subacute sclerosing panencephalitis	8.5 cases per million
Death	0.2% of cases



of death.

- Encephalitis: can occur seven to 10 days after the onset of symptoms with a case fatality rate of approximately 15%. Residual neurologic damage is observed in as many of 25% of those who are affected.
- Seizures: may occur in those with or without fever and subacute sclerosing panencephalitis (SSPE), a very rare complication has an average onset of approximately seven years after measles.
- Death: may also occur but it is very rare.

What is SSPE?

Subacute sclerosing panencephalitis (SSPE) is speculated to be due to the persistence of the measles infection in the brain and results in a degenerative central nervous system disease. It is associated with progressive deterioration of behavior and cognitive function associated with ataxia, myoclonic seizures and ultimately death. The mean time of onset is approximately seven years after the patient suffers from the measles and is a very rare complication. Furthermore, since the licensure of the trivalent vaccine containing the live attenuated measles, mumps and rubella vaccines (MMR), it has become exceedingly rare.

Table 2

Vaccination Considerations

Age of vaccination	• Measles vaccine is recommended for all children ≥ 12 months of age. • The second dose is recommended at 18 months, or four to six years of age (at least 28 days after the first dose).
Adverse reactions	• Fever (occurs most frequently in 5% to 10% of patients). • Seizure in susceptible children (triggered by a fever). • Mild skin rashes (occurs occasionally). • Transient thrombocytopenia. • Encephalitis/ encephalopathy (occurs very rarely in 1/1,000,000).
Precautions and Contraindications	• Individuals whose immune mechanism is impaired, excluding HIV cases (but patients with advanced HIV infection/ AIDS should not receive MMR because it is a live virus vaccine). • History of allergy with neomycin or gelatin, or measles-containing vaccine. • Pregnant women.

MMR: Trivalent vaccine containing the live attenuated measles, mumps and rubella vaccines

How can measles be prevented?

A single dose of MMR vaccine protects approximately 90% to 95% of children against measles. MMR is currently recommended as part of a two-dose schedule in Canada. The second dose does not act as a booster, rather it serves to protect those who were not protected by the first. The first dose of MMR is recommended for all children at 12- to 15- months of age and the second dose should be administered at 4- to 6-years of age. Persons born in 1957 or later should receive at least one dose of MMR. Persons born before 1957 are generally presumed to be immune to measles. All persons who work in medical facilities should be immune to measles. Considerations for vaccination are shown in Table 2.

How are measles diagnosed?

The diagnosis is usually clinical; however, to confirm the diagnosis, serologic testing of acute and convalescent serum should be administered. This will demonstrate a significant rise in anti-measles IgG with a transient increase and subsequent fall in IgM antibodies.

How are measles treated?

In general, management is symptomatic and supportive. The most important thing to be aware of while treating possible complications is a bacterial superinfection, malnutrition and dehydration.

The prognosis is generally very good in developed nations, such as Canada. However, some studies have shown that in the developing world, up to 40% of cases of the measles cause death. Mortality depends upon the nutritional status of the host. Non-vaccinated contacts may be given the MMR vaccine within three days of exposure to measles.

Immunoglobulin works against measles. Once exposed, adults and children who are immunocompromised and have no antibodies to measles, should be given immunoglobulin as soon as possible after exposure. Ideally, this will occur within three days and no more than six days after exposure.

Immunoglobulin should be considered for the following people:

- all children under the age of one,
- all immunologically compromised persons in whom the measles vaccine is contraindicated,
- individuals who are immunocompetent but present too late for vaccine (*i.e.* four to six days after exposure).

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Dr. Nguyen is an International Medical Graduate, whose training is in Obstetrics and Gynecology.

Dr. Embil is a Consultant, Infectious Diseases, and an Associate Professor, University of Manitoba. He is also the Medical Director, Infection Prevention and Control Program, Health Sciences Centre and Winnipeg Regional Health Authority, Winnipeg, Manitoba.