

Research Article

Measles in America

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Measles is a disease caused by a virus that is spread by human contact. It is a respiratory disease that is contagious in untreated or unvaccinated individuals in areas of the world where there is an outbreak of the disease. Measles is also referred to as rubeola. The disease is characterized by flu-like symptoms such as a cough, running nose, fever, and a rash all over the body, feeling aching all over, and red and watery eyes [1]. Infected individuals may also experience conjunctivitis and sensitivity to light [2]. The disease may also cause a rash on the inside of the infected person's mouth. The measles virus breeds in the mucous membranes of the nose and throat. Because it is a respiratory virus, it is spread by infected persons sneezing, coughing, or breathing around a person who has not been vaccinated. The virus may remain alive on objects for up to four hours. Infected persons may infect other people five days prior to a rash appearing and about four days after the rash appears [3].

In the United States, only about sixty people per year are infected with Measles due to stringent vaccination schedules for children from birth to age fifteen [1]. Most of the cases in the United States are due to immigrants from some portions of Europe, Africa, and Asia and from United States citizens visiting these areas. The recommended vaccination schedule for measles in the United States is to give the first dose between the ages of twelve and fifteen months of age and another dose at age four [4]. Because a vast majority of the United States' population is vaccinated, those who do not receive the vaccine have "herd immunity", which means that unvaccinated individuals are protected because those who are vaccinated will not get the measles. This immunity no longer exists if a person from a country where the vaccine is not available comes into the community with active measles. The unvaccinated will likely become infected. This is often the mode of transmission of the disease in the United States and other developed countries. The measles was the cause of about 2.6 million deaths throughout the world prior to 1980 before there were widespread vaccinations [5]. Children are the most at risk population to contract measles, without treatment the complications can have severe lasting effects (Table 2). The treatment regimen usually consists of two doses of vitamin A usually given twenty

four hours apart to prevent damage to the eyes [5].

The graph illustrates how medical centers identify measles and its route of infection (Table 1).

An outbreak of measles could affect my community if there are unvaccinated individuals present. This is a possibility because one affected individual could cause several unprotected or unvaccinated people to become infected. For example, if one member of the community visits from an Eastern country such as India where vaccination schedules are not as stringent as the United States, those children whose parents refused vaccinations will contract the disease if they have contact with the infected individual. Affected children need to be quarantined and treated, affected children would need to refrain from attending school for about two to three weeks, and the community as a whole would need to be informed of the outbreak so that those who are not vaccinated can obtain vaccinations.

If a patient in the community presented to the clinic with SARS, the appropriate protocol reporting the outbreak would be to notify the local health department, notify the Centers for Disease Control, and initiate emergency management protocol for the community. The country that the affected family just visited overseas would need to be contacted as well as the airlines used for travel. The passengers on the plane the family travelled could be infected, and they would need to seek medical attention as soon as possible. Local news media sources should be used to alert the community of outbreak, and the affected family would need to be treated as soon as possible. Local hospitals, clinics, schools, and emergency agencies will need to be notified of the confirmed cases of SARS so they can be prepared to deal with people who may be infected by initiating the use of masks and ensuring strict hand washing. The family will most likely be isolated from the general public, and they need to be monitored until no longer contagious. Any person who has been in the same enclosed area as the family who experiences a temperature of 100.4 degrees F or greater, or has a cough, shortness of breath, trouble breathing, and has been in close contact with a person who has SARS within ten days, travelled to a location that has documented SARS

Case ID	Name (Last, First)	Age	Date of Birth	Rash onset date	Source of exposure	Blood draw date	IgM result	Viral specimen (type, date and result)	MMR-1 date	MMR-2 date	Reason for NOT vaccinating	Case status
1	Doe, Jane	15 yr		12/31/1999	id #2	01-03-2000			9/16/1999	—		—
2	Smith, Stacey	13 mo		12/16/1999		12/27/1999	+		—	—		Lab confirmed
3	Doe, Henry	11 yr		12/26/1999	id #2	01-03-2000			—	—		—
4	Smith, Joe	26 yr		12/30/1999	id #2	01-03-2000			?	—		—

Table 1: Example of line listing for recording data in a measles outbreak investigation.

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outbreak or suspect an outbreak, or within ten days of symptoms had contact in an area within the country that has documented SARS or suspect SARS should seek emergent medical attention [6].

When the air quality index is poor, the community health nurse ensures that his/her patients with asthma or COPD take their prescribed

WHO region	No. of cases	Country	No. of cases	Genotype identified*
African	4	Ethiopia	1	B3
		Kenya	2	B3 (2)
		Nigeria	1	B3
Americas	2	Canada	1	D4
		Dominican Republic†	1	
Eastern Mediterranean	3	Jordan	1	D4
		Pakistan	2	
European	33	Bulgaria	1	D4 (5), G3
		France	13	D4
		France/Germany/Spain§	1	D4
		France/Italy§	1	D4 (3)
		France/Italy/Spain/Germany§	1	D4
		France/Spain/United Kingdom§	1	D4 (2)
		France/United Kingdom§	1	D4 (3)
		Italy	4	
		Poland	1	
		Romania	1	
		Romania/Hungary§	2	
		Spain	1	
		United Kingdom	5	
South-East Asia	19	Bangladesh	1	D4, D8 (5)
		India	16	
		Indonesia	2	
Western Pacific	11	China	2	H1
		Malaysia	2	D9 (2)
		Philippines	6	D9 (4)
		Philippines/Vietnam/Singapore/Malaysia§	1	

Table 2: Countries where imported measles was acquired, by World Health Organization (WHO) region, number of cases (n = 72), and genotype - United States, 2011.

*Genotype was determined based on methodology described by the World Health Organization. Measles virus nomenclature update: 2012. *Wkly Epidemiol Rec* 2012; 87:73-80.

†Although the patient acquired measles in the Dominican Republic, the likely source of infection was a French tourist with measles who stayed in an adjacent room at the same resort at the same time as the patient. The genotype identified in cases epidemiologically linked to this patient was D4, a genotype currently circulating in France.

§Patients had visited more than one country in which measles is endemic during the incubation period, and exposure could have occurred in any of the countries listed.

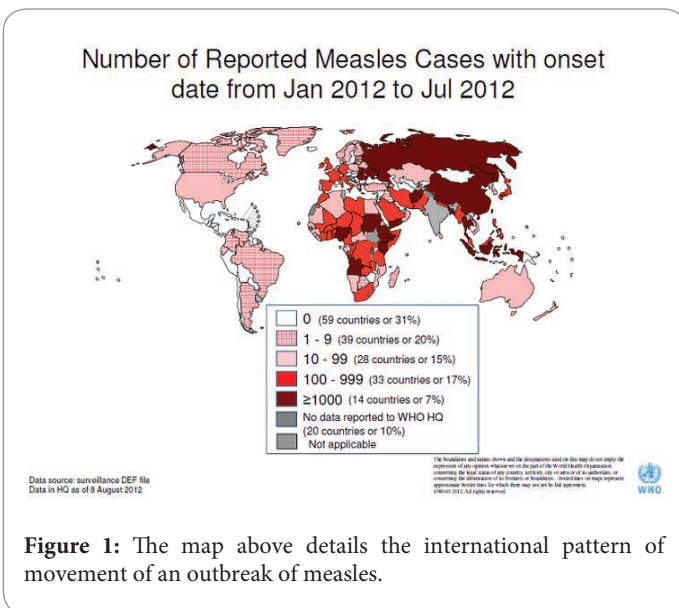


Figure 1: The map above details the international pattern of movement of an outbreak of measles.

medications, avoid going outside if possible, and have a rescue inhaler with them if they do indeed go outside. The community health nurse assesses these patients by making home visits so they do not have to breathe in poor quality air. Patients should be taught to find out about the days' air quality index via newspaper, news shows, and via the internet. If the community health nurse suspects that a patient does not have access to these resources on days when the air quality index is poor, the nurse calls the patients to inform them of the air quality, preferably before they leave their homes. Children should not play outside when the air quality is poor, all COPD patients should not engage in activities such as running a lawn mower or engaging in any other activity where they will be exposed to fumes such as painting. Fires in fireplaces should be avoided, and windows in the home should be kept closed [7]. Patients with respiratory issues should avoid driving, especially in high traffic areas with windows open. All patients' physicians should be contacted to verify whether or not doses of medications should be increased. Those patients who have to be exposed to the air, should limit their time in the air and carry physician information, insurance card, and other identification with them in case of an emergency. These patients should also travel with a family member or friend as well.

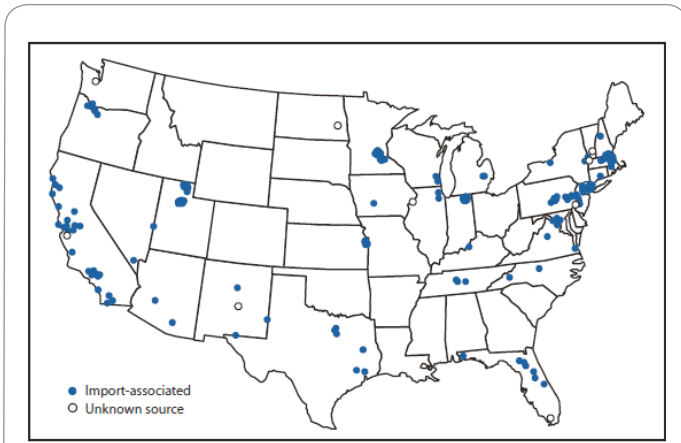


Figure 2: Origin of reported measles cases (N = 222) - United States, 2011. The figure above shows the origin of reported measles cases in the United States during 2011. During 2011, a provisional total of 222 measles cases were reported from 31 states.

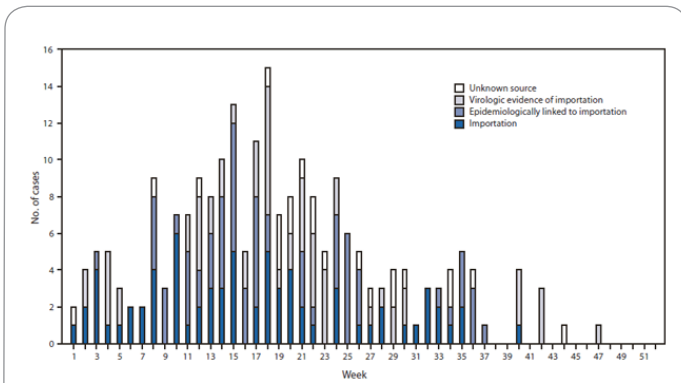


Figure 3: Number of measles cases, by import status and week of rash onset (N = 222) - United States, 2011. The figure above shows the number of measles cases, by import status and week of rash onset in the United States during 2011. Importations were reported during 31 of the 52 reporting weeks.

A measles outbreak occurred in San Diego, California on January 13, 2008 when an unvaccinated child who visited Switzerland with his family returned to the United States [8]. The seven year old boy had not received the vaccination, and the typical signs and symptoms an acute illness such as a fever, sore throat, cough, and conjunctivitis appeared on January 21, 2008. Three days later, the boy attended school, and the next day a rash appeared. Once the rash appeared, the boy's parents took him to a pediatrician where scarlet fever was ruled out as the cause of his sickness. Once the boy's fever exceeded 104 degrees Fahrenheit, he was tested for the measles. It was not until February 1, 2008 that this measles case was reported to the county health department. Three weeks into February, a total of eleven cases of measles were reported, and all were derived from the boy's infection from Switzerland. Two of the infected children were the boy's siblings, five children from the boy's school, and four children from the doctor's office. One of the children infected at the doctor's office flew on a plane to Hawaii with his family, but there were no cases of infection in anyone who was on the plane with the child. This outbreak occurred as a result of California's Personal Belief Exemption from vaccinations. The children from the school who developed measles had parents who did not believe in vaccinations.

When there is an outbreak of measles, research has shown that the path of infection is usually from imported cases from India, Japan and European countries that do not have the disease under control [8,9]. The graph illustrates a pathway that the disease has been spread (Figures 1-3).

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