

SURVEILLANCE REPORT

European monthly measles monitoring (EMMO)

Issue 10: 8 May 2012

Main developments (surveillance)

- During the period 1 January to 28 February 2012, 1 447 cases of measles were reported by the 29 contributing EU and EEA countries.
- Romania accounted for 56% (816) of the cases.
- There were substantially fewer cases in January and February 2012 (1 447) than in the same two months of 2011 (5 731 cases) and 2010 (5 752 cases).
- Two cases of measles encephalitis were reported.
- There were no deaths.
- Epidemic intelligence findings indicate that measles transmission is at a much lower level during the ongoing peak transmission season compared to the 2011 and 2010 peak seasons.

Surveillance data

The enhanced measles surveillance data was retrieved from TESSy on 27 March 2012, and the analysis covers the period from 1 January to 28 February 2012.

Twenty-eight countries reported case-based data for the entire period, while Romania reported aggregated data for February and case-based data for January. Romania's switch from case-based to aggregated data in February is due to an increase in the number of cases, which prohibits timely reporting of case-based data. Information on case classification, vaccination status and age presented in this report is based on combined case-based and aggregated data, while information on complications, outcome and importation status is based on case-based data only.

In January–February 2012, 1 447 measles cases were reported to ECDC (Table 1). Romania is the only country exceeding a notification rate of one case per 100 000 population during the period; the country accounted for 56% (816) of all cases. The total number of cases reported in January and February 2012 is considerably lower than that reported for the same months in 2011 (5 731 cases) and 2010 (5 752 cases). Twelve countries reported zero cases in January and February 2012 (Figures 2 and 4).

Of all cases reported in January–February 2012, 61% (886 cases) were laboratory confirmed, 25% (364 cases) were reported as probable (epidemiologically linked), and 13% (194 cases) as possible. Three reports lacked information on case classification. The 2008 EU case definition for measles was used by 20 (69%) countries.

The highest notification rate was among infants under one year (3.8 cases per 100 000 population), followed by children aged between one and four years (1.9 cases per 100 000 population); see Figure 6.

Vaccination status was known for 91% (1 315) of the reported cases. Of these, 83% (1089) were unvaccinated and 17% (226) were vaccinated. Among those vaccinated, 75% (170) had received one dose of measles vaccine, 22% (50) had received two or more doses, and six cases had received an unknown number of doses.

Complication status was reported on for 65% (752) of the 1 160 case-based notifications. Two cases developed encephalitis, 169 cases were complicated by pneumonia, 35 cases had other complications, and 544 cases were free of complications (Table 2). Information on complications was either missing or reported as unknown for 408 (35%) of the case-based reports. Disease outcome was missing for 15% of the reported cases (Table 2). There have been no reports of fatal outcomes in 2012 so far.

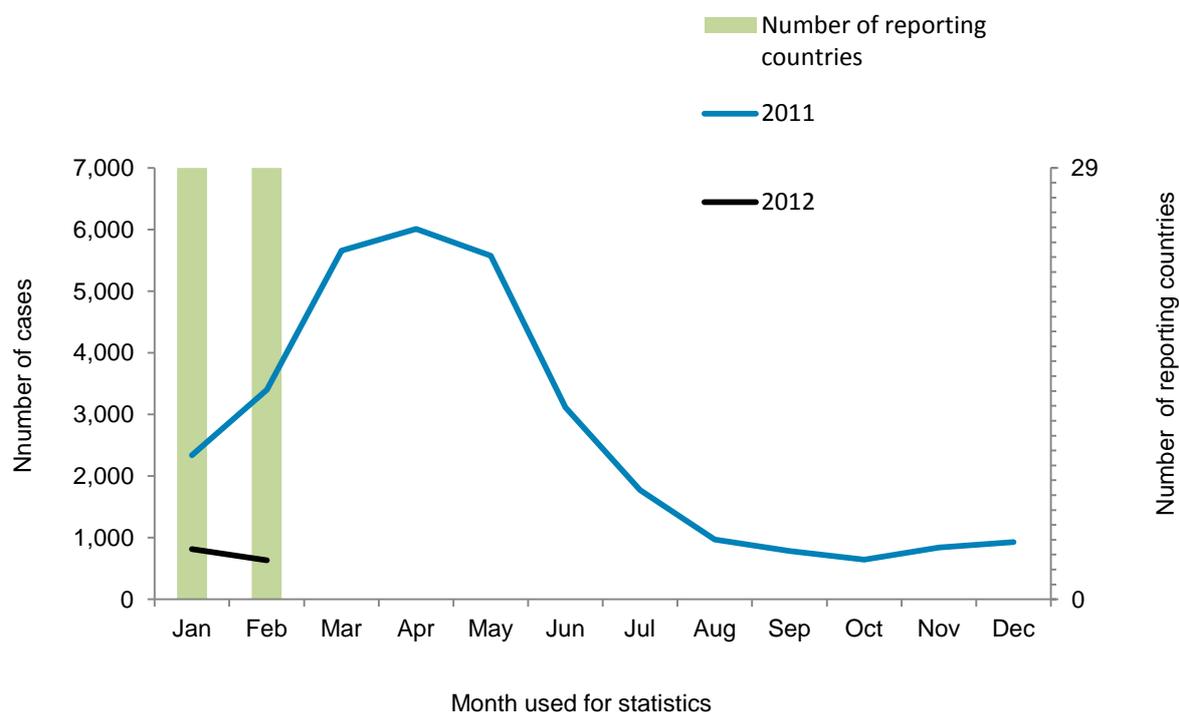
Importation status was reported for 74% (859) of the cases and of those, 96% (823 cases) were infected in their country of residence; 3.6% (31 cases) were infected abroad and recorded as imported cases* and five cases were import related*.

Table 1. Number of measles cases by month, notifications per 100 000 population, and comparison with the same period in 2011; EU and EEA countries, 2012

Country	2012				2011			
	Jan	Feb	Cumulative cases	Notifications per 100 000 population in the year	Jan	Feb	Cumulative cases	Notifications per 100 000 population in the year
Austria	0	0	0	0	7	5	12	0.1
Belgium	10	7	17	0.2	9	23	32	0.3
Bulgaria	0	0	0	0	76	27	103	1.4
Cyprus	0	1	1	0.1	0	0	0	0
Czech Republic	3	2	4	0.04	0	0	0	0
Denmark	1	0	1	0.02	7	13	20	0.4
Estonia	0	0	0	0	0	0	0	0
Finland	1	1	2	0.04	1	1	2	0.04
France	105	122	227	0.3	1532	2433	3965	6.1
Germany	3	17	20	0.02	48	89	137	0.2
Greece	0	0	0	0	0	2	2	0.02
Hungary	0	0	0	0	0	0	0	0
Iceland	0	0	0	0	0	0	0	0
Ireland	6	7	13	0.3	0	5	5	0.1
Italy	53	74	127	0.2	337	340	677	1.1
Latvia	0	2	2	0.1	0	0	0	0
Lithuania	0	0	0	0	0	0	0	0
Luxembourg	0	0	0	0	0	0	0	0
Malta	0	0	0	0	0	1	1	0.2
Netherlands	0	0	0	0	2	1	3	0.02
Norway	0	0	0	0	4	12	16	0.3
Poland	1	2	3	0.008	1	2	3	0.01
Portugal	1	0	1	0.01	0	0	0	0
Romania	529	287	816	3.8	131	192	323	1.5
Slovakia	0	0	0	0	0	0	0	0
Slovenia	1	0	1	0.05	0	0	0	0
Spain	58	53	111	0.2	145	216	361	0.8
Sweden	2	14	16	0.2	4	1	5	0.1
United Kingdom	39	45	84	0.1	31	33	64	0.1
Total	813	634	1447	0.3	2335	3396	5731	1.1

Source: TESSy. Notification rates were calculated using the most recent population estimates available from Eurostat (2011). Countries with a notification rate ≥ 1.0 per 100 000 population are highlighted in green.

* An 'imported case' is defined as a case in which the source of infection was outside the country of residence, and the person in question was travelling abroad during the incubation period prior to the onset of the rash (measles: 7–18 days; rubella: 12–23 days). Classification as an imported case is also supported by epidemiological and/or virological evidence of foreign-acquired infection. An 'import-related case' is a case epidemiologically linked to an imported case, as supported by epidemiological and/or virological evidence. All import-related cases are to be considered as indigenous cases. See also: WHO. Surveillance guidelines for measles, rubella and congenital rubella syndrome in the WHO European Region. Copenhagen: WHO Regional Office for Europe; 2009.

Figure 1. Distribution of measles cases in 2011 and 2012 and number of countries reporting in 2012, by month

Source: TESSy

Reporting countries: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom

Table 2. Outcomes and complications of measles, reported by EU/EEA countries (n=29*), January–February 2012

Outcome	Number of cases	%
Deaths	0	
Cases with information on outcome status	985	84.9
Unknown or not reported**	175	15.1
Complications		
Encephalitis	2	0.2
Pneumonia	169	14.6
Diarrhoea	12	1.0
Otitis media	2	0.2
Other complications	23	2.0
No complications	544	46.9
No information provided/unknown**	408	35.2
Total	1 160	100

Source: TESSy

* Data from Romania from February 2012 were not included in the analysis because the variable was not reported in case-based format.

** The values for the variables 'Outcome' and 'Complications' include 'Unknown' which means that the reporting officer does not have access to information on outcome. If no value is entered for the variables 'Outcome' and 'Complications', it will be reported as 'No information provided'. The two values 'No information provided' and 'Unknown' are aggregated in the table.

Figure 2. Distribution of measles cases reported to TESSy by EU and EEA countries for January–February 2012 (n=1 447) and two-dose measles vaccine coverage* (2010 CISID)

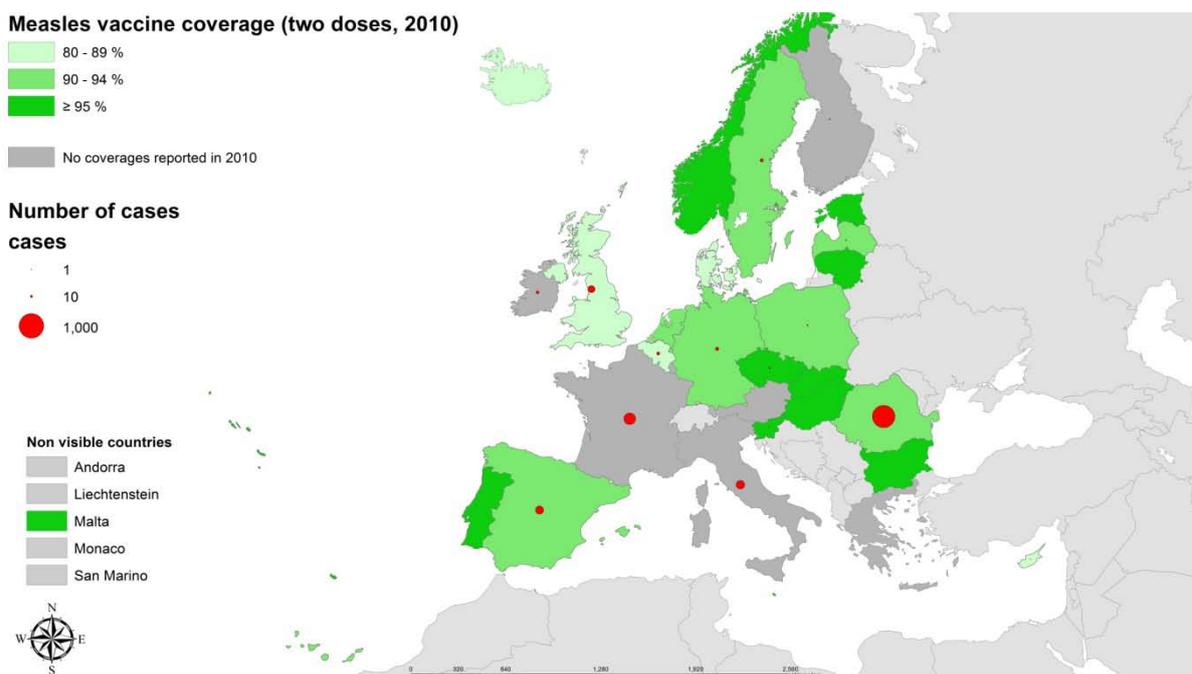
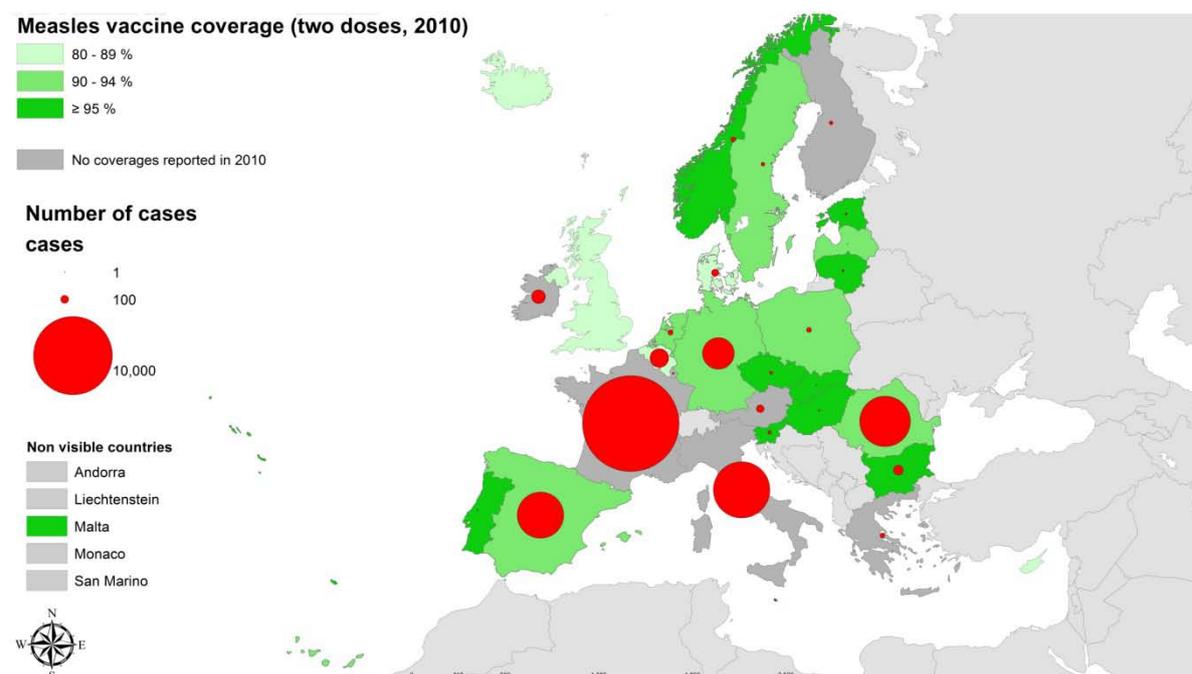


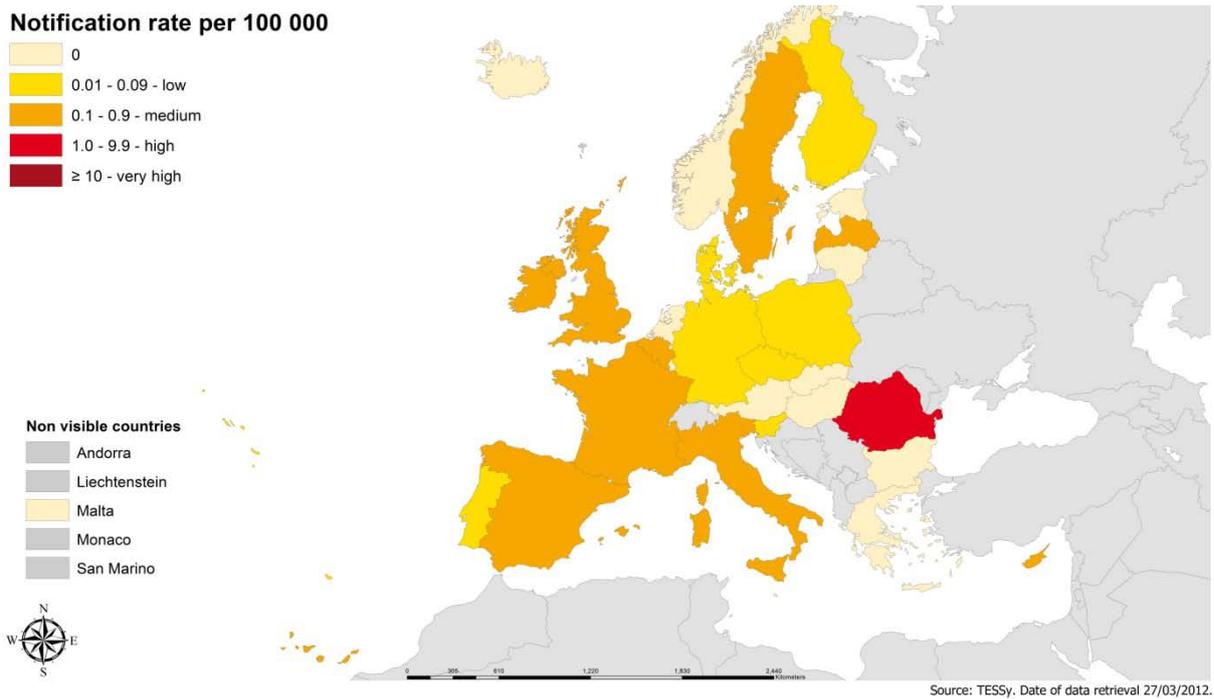
Figure 3. Distribution of measles cases reported to TESSy by EU and EEA countries for January–December 2011 (n=32 021) and two-dose measles vaccine coverage* (2010 CISID)



Sources: TESSy and CISID

* Coverage figures (%) are official national figures reported via the annual WHO/UNICEF Joint Reporting Form and WHO Regional Office for Europe reports (as of 27 January 2012).

Figure 4. Distribution of notification rates (cases per 100 000 population) by country, EU and EEA countries, January–February 2012 (n=1 447)



Source: TESSy. Notification rate calculated as (cases/population)*100 000

Figure 5. Distribution of notification rates (cases per 100 000 population) by country, EU and EEA countries, January–December 2011 (n=32 021)

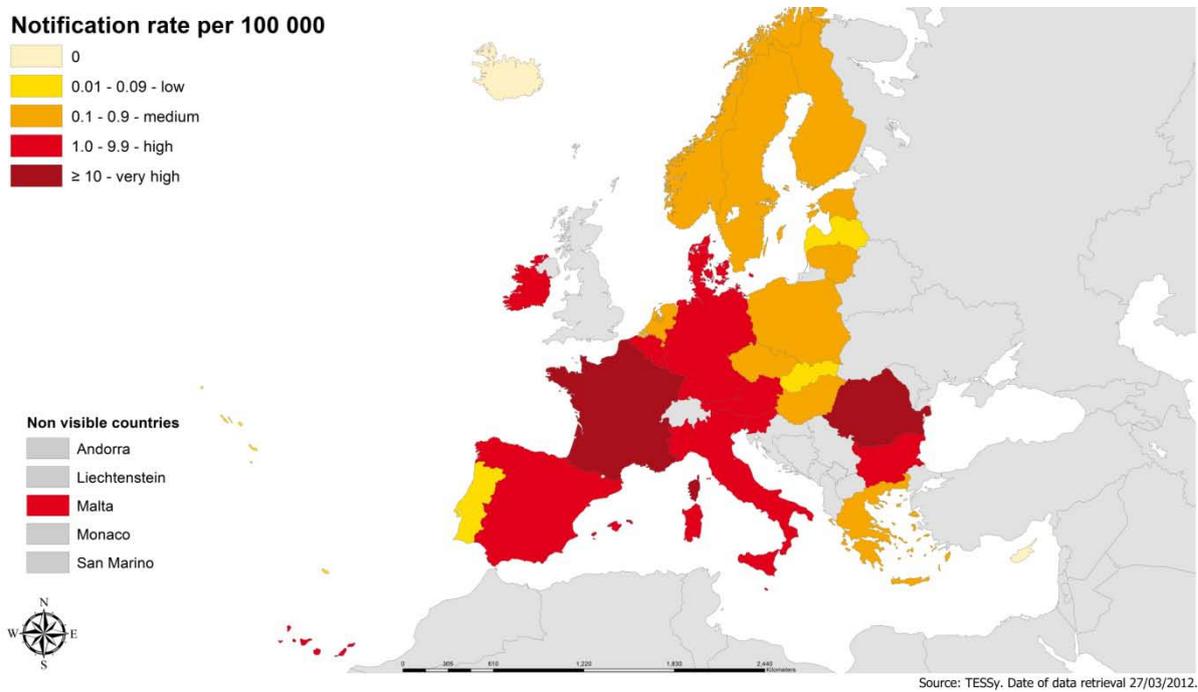
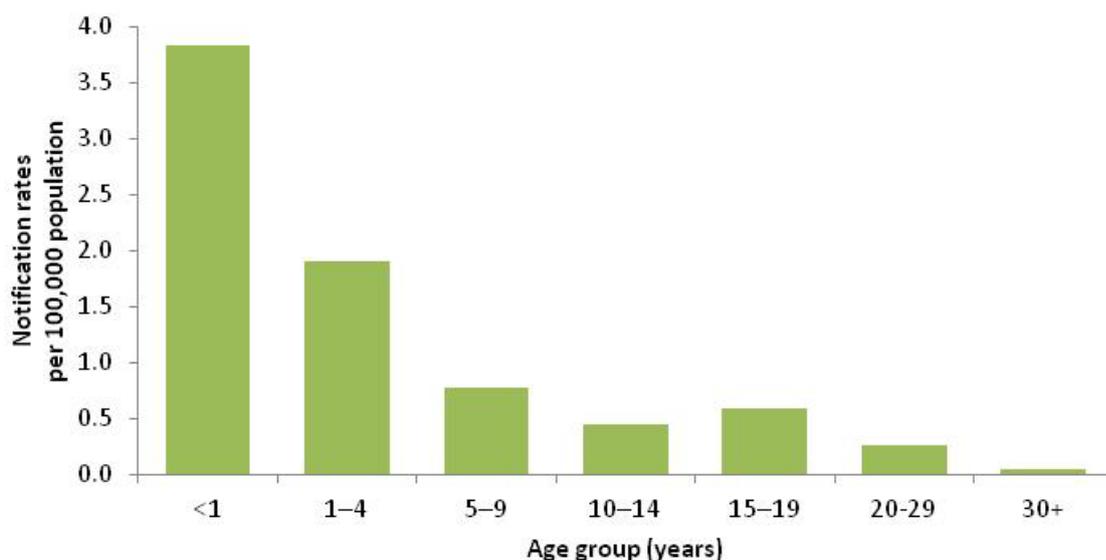


Figure 6. Notification rates (cases per 100 000 population), by age group, January–February 2012, EU/EEA countries (n= 1 445 cases with known age)



Source: TESSy

Epidemic intelligence

Considerably fewer outbreaks have been detected in EU Member States in 2012 compared to the same period last year, with the exception of three countries: the UK, Romania and Spain.

So far this year, the UK has recorded 1 206 suspected or confirmed cases of measles resulting from several ongoing outbreaks. One outbreak with 186 confirmed cases in the Merseyside area is the largest in the northwest of England since MMR vaccine was introduced in 1988. In Wales, 112 suspected cases were notified during the first three months of 2012 (compared to 120 cases for the whole of 2011), most of them within the geographical area of a secondary school where a large outbreak started in early 2012.

Neighbouring countries

Ukraine

Source: [Ministry of health](#)

As of 24 April 2012, 8 082 cases of measles were recorded in six districts.

Rest of the world

United States

Source: [Morbidity and Mortality Weekly Report \(MMWR\)](#)

In 2011, the US saw the highest number of measles cases in 15 years with many of the cases linked to foreign travel, especially to Europe. There were 222 cases reported from 31 US states and 17 outbreaks, with an outbreak defined as three or more cases linked in time or place. The median outbreak size was six cases (range: 3–21 cases), and outbreaks lasted a median of 18 days (range: 6–69 days). No measles deaths were reported, but about a third of the sick required hospitalisation. Almost half (46%) of the 72 measles cases which were classified as imported had been infected in Europe. CDC recommends that all healthcare providers should remind patients who plan to travel abroad about vaccinations and the increased risk of being exposed to measles on buses, trains and planes, and at large international events and mass gatherings such as the Euro 2012 football championship and the 2012 London Summer Olympics.

Topic of the month

The measles virus, the vaccine, and its side effects

Measles virus

It is generally believed that the human measles virus evolved from a zoonotic virus in communities where humans lived in close contact with cattle and that it was established as an endemic human disease about 5 000 to 10 000 years ago in the Middle Eastern river valley civilisations. Phylogenetic analysis suggests a more recent divergence from cattle rinderpest virus in the 11th or 12th century. Measles virus is related to canine distemper virus. Measles is an antigenically stable virus and infection confers lifelong immunity. There is just one measles serotype and 23 identified genotypes which can be used to track transmission. The genetic difference between these lineages is small, and changes in the genotypes have no practical influence on the protective efficacy of the measles vaccines currently in use. Today's measles vaccines are based on viruses attenuated decades ago.



'The young child', woodcut from the Dance of Death series, 1523–26, by Hans Holbein the Younger

Measles was an expected life event in the pre-vaccine era. References to measles can be found as far back as the 7th century A.D. In the 10th century, a Persian physician and philosopher known in the West as Rhazes described measles as being 'more dreaded than smallpox'. The clinical manifestations of measles were described by the English physician Thomas Sydenham in the 17th century. The first major advance in the study of measles was in 1846 when Danish doctor Peter Parnum observed and carefully described a measles outbreak in the Faroe Islands. Parnum confirmed the infectiousness of measles, defined the incubation period of two weeks, and noted that individuals became immune after having had the disease. In 1954, Enders and Peebles isolated the virus and succeeded in growing it in tissue cultures. Serial passage of the virus through tissue culture reduced its virulence for humans, and in 1963 the first live, attenuated vaccine was licensed for use. Subsequently in 1971, a combined measles, mumps, and rubella vaccine (MMR) as well as a combined measles and rubella vaccine (MR) were licensed. Since measles vaccine became available, the number of measles cases dropped by 99 percent.

Immune response to measles infection and to vaccination

When a person becomes infected with the measles virus, there is a cell-mediated immune response followed by an antibody-mediated response at the time of the rash. Measles antibody titres may diminish over time but measles virus-specific cellular immunity is thought to persist.

Vaccine-induced immunity lasts at least several decades, if not longer. Decreasing antibody concentrations do not necessarily mean a complete loss of protective immunity, because a secondary immune response usually develops after re-exposure to measles virus, with a rapid rise in antibody titres without overt clinical disease.

Young infants are usually protected against measles until 6–9 months of age due to passively acquired maternal antibodies. The protection of maternal antibodies may sometimes be insufficient if the infectious dose is large enough and, as a result, infants as young as 3–4 months old can contract measles. The antibody levels are usually higher after natural measles infection than after measles vaccination. Infants in non-endemic countries born to mothers who have been vaccinated against measles and have never been exposed to circulating measles virus may

receive less maternal antibodies and therefore lose protection against measles earlier than infants born to mothers with a history of measles disease.

Immunogenicity and reactogenicity of the individual components are similar when MCVs are administered as combined products or simultaneously at different anatomical sites with other vaccines, such as diphtheria toxoid, tetanus toxoid, pertussis vaccine, *Haemophilus influenzae* type b (Hib) vaccine, poliovirus vaccines, varicella vaccine, hepatitis B vaccine, or heptavalent pneumococcal vaccine.

Facts about measles vaccine

- Measles vaccine, like measles virus, is very stable when stored between $-70\text{ }^{\circ}\text{C}$ and $-20\text{ }^{\circ}\text{C}$.
 - Measles vaccine is sold as a powder accompanied by a diluent in a separate vial. Before use, the vaccine must be reconstituted.
 - After reconstitution, the vaccine becomes sensitive to heat. It loses about 50% of its potency after one hour at $20\text{ }^{\circ}\text{C}$ and almost all potency after one hour at $37\text{ }^{\circ}\text{C}$.
 - The vaccine is also sensitive to sunlight, which is why it is sold in tinted glass vials.
 - After reconstitution, the vaccine must be stored in the dark at $2\text{--}8\text{ }^{\circ}\text{C}$ and used within six hours.
 - It is administered as a subcutaneous injection but is also effective when administered intramuscularly.
 - Each dose of 0.5 ml contains at least 1 000 infective units of the vaccine virus also when it is combined with mumps and/or rubella vaccines.
 - The recommended age of first vaccination varies from six to 15 months and is a balance between the optimum age for sero-conversion and the probability of acquiring measles before that age.
 - The proportion of children who develop protective concentrations of antibody after measles vaccination is about 85% at age nine months and about 95% at 12 months.
 - A population immunity of 95% is necessary to interrupt transmission. In order to achieve such high population immunity to measles, two doses of vaccine should be administered because some recipients fail to develop protective antibodies from the first dose but will often do so from the second dose.
- A number of live, attenuated measles vaccines are currently available, either as monovalent vaccine or as measles-containing vaccine combinations (MCVs) with one or more of rubella (R), mumps (M), and varicella (V) vaccines. When used in combination, the vaccines' protective immune responses to each individual vaccine antigen as well as vaccine-associated adverse events remain largely unchanged.

Future vaccines

The ideal measles vaccine would be inexpensive, safe, heat stable, immunogenic in newborns and young infants, and administered as a single dose without a needle or syringe. Candidate vaccines and delivery methods which fulfil some of these requirements are being developed and tested:

- Aerosol delivery of measles vaccine to the respiratory mucosa, imitating the natural route of transmission for measles virus, is the most promising new method studied so far. A phase II/III study was carried out recently in India by WHO's Measles Aerosol Project, and if the efficacy proves to be as high as in previous trials, which matched needle vaccination, the aerosol method could soon be rolled out. Aerosol delivery devices are available or being developed and could be used by non-experts with limited training, thus avoiding issues of injection safety.
- Other candidates and methods include alternative techniques for the administration of measles virus genes using vectors, naked cDNA vaccines and oral immunisation by means of plant-based expression of the measles virus haemagglutinin protein in tobacco.

Adverse effects of measles-mumps-rubella (MMR) vaccine

Since the 1990s, vaccines have become controversial in several regions of the world. As vaccine-preventable diseases have all but disappeared, entire generations (including healthcare workers) have never witnessed the suffering caused by these diseases. At the same time, new parents are often upset when their babies, after receiving injections, still have to suffer from pain and mild fever – a common side effect of vaccination. In addition, rumours are spread that the MMR vaccine can cause autism. Numerous studies have failed to show a link between the MMR vaccine and autism. However, an active anti-vaccine lobby keeps the issue alive. The public concern over the safety of the MMR vaccine led to diminished vaccine coverage in several parts of the world.

Immunisations, like any medication, can cause side events. However, the decision not to immunise a child also involves a considerable risk. It is an active decision to expose the child and others who come into contact with it to the risk of contracting a potentially dangerous or even deadly disease. The cost-benefit of measles vaccination is well documented. In fact, measles immunisation saves more lives per unit cost than any other health intervention.

Getting MMR vaccine is much safer than getting any of the three diseases and the risk of MMR vaccine causing serious harm, or death, is extremely small. Adverse events, with the exception of anaphylactic reactions, are less likely to occur after receipt of a second dose of measles-containing vaccine. Person-to-person transmission of measles vaccine strains has never been documented.

Common mild reactions:

- Slight pain and tenderness at the site of injection may occur within 24 hours, sometimes followed by mild fever and swelling of the local lymph nodes.
- About 7–12 days after vaccination, up to 5% of measles vaccine recipients may experience fever of at least 39.4 °C for 1–2 days, which may occasionally (1: 3 000) induce febrile seizures.
- About one in 20 children develop a mild rash five to 12 days after receiving the vaccine. The rash usually lasts about two days.
- Joint pains of short duration can occur in 10–25% of adult females.
- The mumps virus component sometimes causes mild parotitis 7–12 days after vaccination and, on rare occasions, benign aseptic meningitis or orchitis.

Rare severe reactions:

- Thrombocytopenia purpura occurs in approximately 1 in 30 000 vaccinated individuals.
- Anaphylaxis has been estimated to occur about once for every million doses administered, while a severe allergic reaction can occur once for every 100 000 doses.
- Encephalitis has been reported to occur no more than once per million doses administered, and even in these cases there is no definite proof that the vaccine was the cause.
- There is no association between history of egg allergy and allergic reactions to the measles vaccine.

Receiving multiple vaccines

Giving a child several vaccinations during the same visit offers practical advantages because giving several vaccinations at the same time means fewer visits to the healthcare system. This saves parents both time and money, and may be less traumatic for the child.

The available scientific data show that simultaneous vaccination with multiple vaccines has no adverse effect on the normal childhood immune system. A number of studies were conducted to examine the effects of giving various combinations of vaccines simultaneously. These studies show that the recommended vaccines are as effective in combination as they are individually, and that such combinations carry no greater risk for adverse side effects.

Other news

Symposium 'Progress toward rubella elimination and CRS prevention in Europe', February 2012, Rome, Italy

This international symposium aimed to increase awareness about rubella and congenital rubella syndrome and to remind the medical community and partners in the WHO European Region of the effectiveness of MMR vaccination against rubella. More details can be found here: <http://www.sabin.org/events/progress-toward-rubella-elimination-and-crs-prevention-europe>.

WHO recommendations for interrupted and delayed vaccination

WHO has consolidated its recommendations for interrupted and delayed vaccination and made them available in one summary table, in order to help guide national immunisation programmes:

<http://www.euro.who.int/en/what-we-do/health-topics/disease-prevention/vaccines-and-immunization/news/news/2012/03/who-recommendations-for-interrupted-and-delayed-vaccination-now-available>

Related links

More information about measles is available on the ECDC website:

<http://ecdc.europa.eu/en/healthtopics/Pages/Measles.aspx>

Information about vaccines and immunisation from the World Health Organization's Regional Office for Europe website: <http://www.euro.who.int/en/what-we-do/health-topics/communicable-diseases/measles-and-rubella>

Website for WHO CISID database: <http://data.euro.who.int/cisid/>

More information on the surveillance of vaccine-preventable diseases in the European Union is available from the [EUVAC-Net](#) website.

Notes

1) The European Surveillance System (TESSy) reports 'date used for statistics', which is a date chosen by the country for reporting purposes. Such date may indicate onset of disease, date of diagnosis, date of notification, or date of laboratory confirmation.

2) Countries report on measles and other vaccine-preventable diseases to TESSy at their own convenience. This implies that the date of retrieval can influence the presentation of data. For this reason, the date of data retrieval is indicated for all EMMO issues. The date of retrieval for this issue was 27 March 2012. Inconsistencies with measles data reported in previous issues might arise as countries may update their data in TESSy retrospectively.