



SURVEILLANCE REPORT

European monthly measles monitoring (EMMO)

Issue 7: 16 January 2012

Main developments

- During the period January to November 2011, 28 887 cases of measles were reported to TESSy by the 29 contributing EU and EEA countries. There were eight measles-related deaths and 26 cases of acute measles encephalitis. The highest incidence was among infants under one year (39.1 cases per 100 000 population). Ninety-seven percent of cases were infected in their country of residence. Of the cases with known vaccination status, 82% were unvaccinated.
- Three out of the 29 reporting countries remained measles free until the end of November 2011: Cyprus, Hungary and Iceland. Hungary contained a small imported outbreak of five cases in December 2011.
- The peak measles transmission period is approaching and the number of new measles cases is expected to start increasing towards the end of January.
- New outbreaks have been reported in two EU neighbouring countries: Ukraine and Russia.

Background

The purpose of the European Monthly Measles Monitoring report (EMMO) is to provide regular and timely updates on the measles situation in Europe in support of effective disease control, increased public awareness and the achievement of the 2015 measles elimination target.

Measles is a highly infectious and potentially fatal disease which can be prevented by a safe and effective vaccine. When given in two doses, at least 98% of vaccine recipients develop long-term protective immunity. Measles only infects humans and theoretically the virus can be eradicated if a large enough proportion of the world's population

is vaccinated. The countries in the European region of the World Health Organization, which includes all EU and EEA/EFTA countries, have committed to eliminating measles transmission by 2015. Elimination means permanent interruption of transmission in all European countries. When elimination has been achieved in a country, importation of measles should result only in limited outbreaks. To eliminate measles requires sustained vaccination coverage above 95% with two doses of a measles-containing vaccine (MCV) in all population groups, vigilant surveillance and rapid and effective outbreak response.

ECDC closely monitors measles transmission in Europe through the mandatory reporting of cases to The European Surveillance System (TESSy) and epidemic intelligence (EI) activities. All 27 EU and two EEA countries contribute to the enhanced measles surveillance. Reporting is case-based and includes gender, age, date of onset, mode of transmission, complications and outcomes. The data is analysed monthly and presented in the EMMO and the ECDC Annual Epidemiological Report. After validation by the contributing countries, the case-based data is forwarded to WHO's global database. Epidemic intelligence sources include the TESSy database, national websites, the Early Warning and Response System (EWRS), validated media reports and personal communication from national authorities. The ECDC Epidemic Intelligence Information System for Vaccine Preventable Diseases (EPIS-VPD) is an ECDC-hosted platform which enables countries to share information and post inquiries about vaccine preventable diseases. Access to EPIS-VPD is restricted to authorised national focal points in order to ensure rapid and confidential communication about outbreaks.

EMMO data on vaccination coverage is retrieved from WHO's Centralized Information System for Infectious Diseases (CISID) unless otherwise stated. CISID data originates from the WHO/UNICEF Joint Reporting Forms submitted annually by all WHO Member States. It should be noted that countries use different methodologies and definitions to estimate vaccination coverage, and that the recommended age for measles vaccination, particularly for the second dose, varies considerably between countries. Direct comparisons of vaccination coverage between countries should therefore be made with caution.

The EMMO report consists of three sections. The first section is an analysis of the enhanced measles surveillance data reported to TESSy and validated by countries. The figures presented in this section represent official national data on measles and contribute to the chapter on Vaccine Preventable Diseases (VPD) in the ECDC Annual Epidemiological Report on Communicable Diseases in Europe. The second section presents outbreak information generated through epidemic intelligence at ECDC. The purpose of this section is to provide rapid information on ongoing measles transmission in the Member States and the data presented in the EI section should be treated as preliminary. The third section, *Topic of the month*, covers a topic of interest to measles disease experts, public health specialists and policy makers working in the area of measles eradication.

Surveillance data (to 30 November 2011)

Enhanced measles surveillance data was retrieved from TESSy on 19 December 2011 and the analysis covers the period from 1 January to 30 November 2011. Twenty-seven countries reported data for the entire period, Austria reported for January to October and Germany reported for January to August. All countries currently report case-based data. Bulgaria reported aggregated data from January to July.

Between January and November 2011, 28 887 measles cases were reported to TESSy (Table 1). France reported the highest number of cases as well as the highest rate per 100 000 population, and accounts for more than half of all reported cases in 2011. Other countries with high case numbers in 2011 include Italy and Romania, both of which have experienced widespread outbreaks affecting most of their regions. Some countries with smaller populations, including Belgium, Denmark, Norway, and Slovenia, have reported considerable increases in case numbers compared to 2010.

Thirteen of the 29 reporting countries have notification rates above one case per 100 000 population (Figure 3). Only three countries, Cyprus, Hungary, and Iceland reported no measles cases in the period January–November 2011 (Table 1, Figure 3).

The number of measles cases reported as at 30 November 2011 is similar to the number reported during the same period in 2010. However, in the last two years the incidence has been considerably higher than in 2009 (7 175 cases) and 2008 (7 817 cases).

Two more cases of measles encephalitis were reported since the [previous EMMO](#), which brings the total to 26 cases in 2011. The number of measles-related deaths remains eight. Reporting on outcomes and complications of measles to TESSy is incomplete (Table 2).

Of the reported cases, 43% (12 283 cases) were reported as laboratory confirmed, 22% (6 302 cases) as probable, 34% (9 951 cases) as possible cases, and 1% (351 cases) were reported as unknown. The 2008 EU case definition was used by 17 (59%) countries. The highest incidence was among infants under one year (39.1 cases per 100 000 population), followed by children between 1 and 4 years (21.9 cases per 100 000 population) (Figure 4).

Vaccination status was known for 83% (23 846) of the reported cases. Of these, 82% (19 556) were unvaccinated, 13% (3 191) had received one dose of measles vaccine and 4% (858) had received two or more doses. Importation status was reported for 68% (19 556) of cases, 94% (18 421 cases) of them were infected in their country of residence, 3% (620 cases) were imported, and 0.2% (30 cases) were import-related.*

Table 1. Number of measles cases by month, notifications per 100 000 population, and comparison with previous reporting period in 2010; EU and EEA countries, 2011.

Country	January	February	March	April	May	June	July	August	September	October	November	Jan - Nov 2011		Jan - Nov 2010	
												No. of cases	Notifications per 100 000 pop.	No. of cases	Notifications per 100 000 pop.
Austria	7	5	5	9	18	33	16	4	2	0	nr	99	1.2	41	0.5
Belgium	6	23	142	98	121	86	44	11	13	4	15	563	5.2	40	0.4
Bulgaria	76	28	23	6	18	1	0	0	1	0	1	154	2.1	21 940	290.1
Cyprus	0	0	0	0	0	0	0	0	0	0	0	0	0	18	2.2
Czech Rep.	0	0	4	4	4	0	1	3	0	0	0	16	0.2	0	0
Denmark	7	13	23	19	19	0	2	0	0	0	0	83	1.5	5	0.1
Estonia	0	0	4	1	1	1	0	0	0	0	0	7	0.5	0	0
Finland	1	1	1	4	12	2	0	5	1	0	0	27	0.5	5	0.1
France	1 560	2 453	3 730	3 317	2 275	925	410	148	88	79	91	15 076	23.2	4 022	6.2
Germany	69	95	195	428	434	167	92	nr	nr	nr	nr	1 480	1.8	721	0.9
Greece	0	2	6	17	10	2	0	3	0	0	0	40	0.4	148	1.3
Hungary	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Iceland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ireland	0	5	11	17	12	30	33	65	72	33	20	298	6.7	399	8.9
Italy	335	339	577	920	1 301	848	415	174	95	48	38	5 090	8.4	752	1.2
Latvia	0	0	0	0	0	0	0	1	0	0	0	1	0.04	0	0
Lithuania	0	0	0	1	2	4	0	0	0	0	0	7	0.2	2	0.1
Luxembourg	0	0	1	0	2	1	0	1	1	0	0	6	1.2	0	0
Malta	0	1	0	1	0	0	0	1	1	0	0	4	1.0	0	0
Netherlands	2	1	10	16	11	5	0	1	0	0	0	46	0.3	12	0.1
Norway	4	12	7	2	3	5	1	1	2	1	0	38	0.8	3	0.1
Poland	1	2	1	3	9	6	1	10	5	1	0	39	0.1	13	0.03
Portugal	0	0	1	0	0	0	0	0	0	0	0	1	0.009	5	0.05
Romania	131	192	402	396	514	455	377	0	0	351	0	2 818	13.1	107	0.5
Slovakia	0	0	0	1	0	1	0	0	0	0	0	2	0.04	0	0
Slovenia	0	0	0	2	1	7	12	0	0	0	0	22	1.1	5	0.2
Spain	100	162	251	448	362	175	158	93	78	62	25	1914	4.1	239	0.5
Sweden	4	1	1	8	4	1	2	1	0	0	4	26	0.3	0	0
UK	31	33	143	172	186	133	105	60	54	73	40	1030	1.6	391	0.6
Total	2 334	3 368	5 538	5 890	5 319	2 888	1 669	582	413	652	234	28 887	5.7	28 868	5.7

Source: The European Surveillance System (TESSy).

Notifications rates were calculated using the most recent population estimates available from Eurostat. (nr = no data reported.)
 = Notification rate > 1.0 per 100 000 population in 2011.

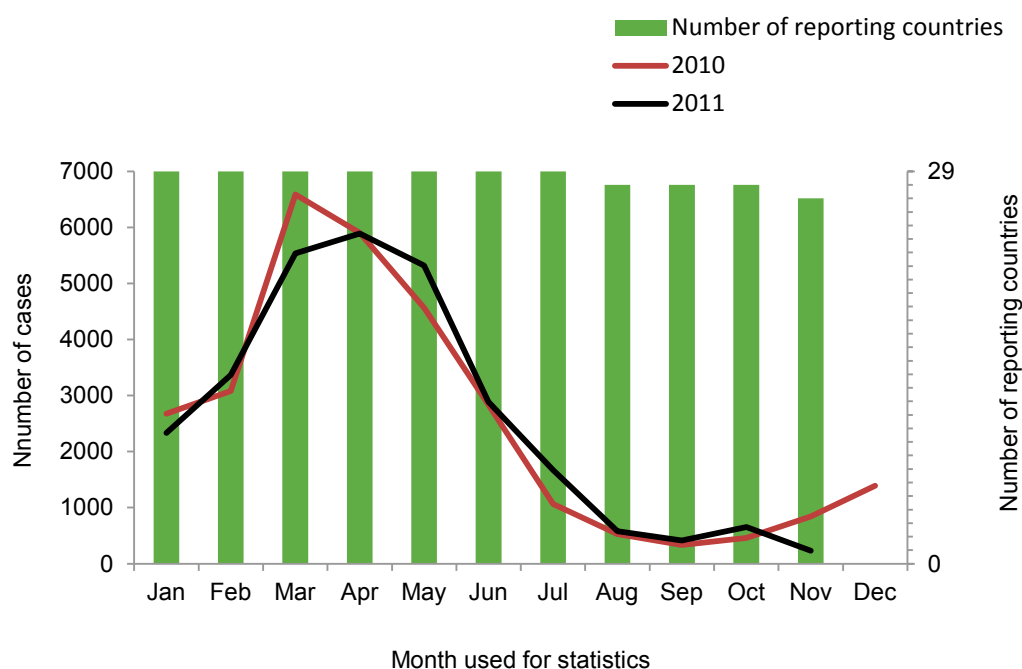
*An 'imported case' is defined as a case in which the source of infection was outside the country of residence, and the person in question was travelling abroad during the incubation period prior to the onset of the rash (measles: 7–18 days; rubella: 12–23 days). Classification as an imported case is 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.

Table 2. Outcomes and complications of measles; EU and EEA countries, January–November 2011

Outcome	Number	%
Deaths	8	0.03
No information provided/unknown	7 319	25
Complications		
Encephalitis	26	0.1
Pneumonia	1 040	4
Diarrhoea	65	0.2
Otitis media	212	0.7
Other complications	1 764	6
No complications	3 009	10
No information provided / unknown	22 771	79
Total cases	28 887	100

Source: TESSy.
Data missing from Germany for August–November and from Austria for November.

Figure 1. Distribution of measles cases in 2011 and 2010 and number of countries reporting in 2011, by month† (n=28 887)

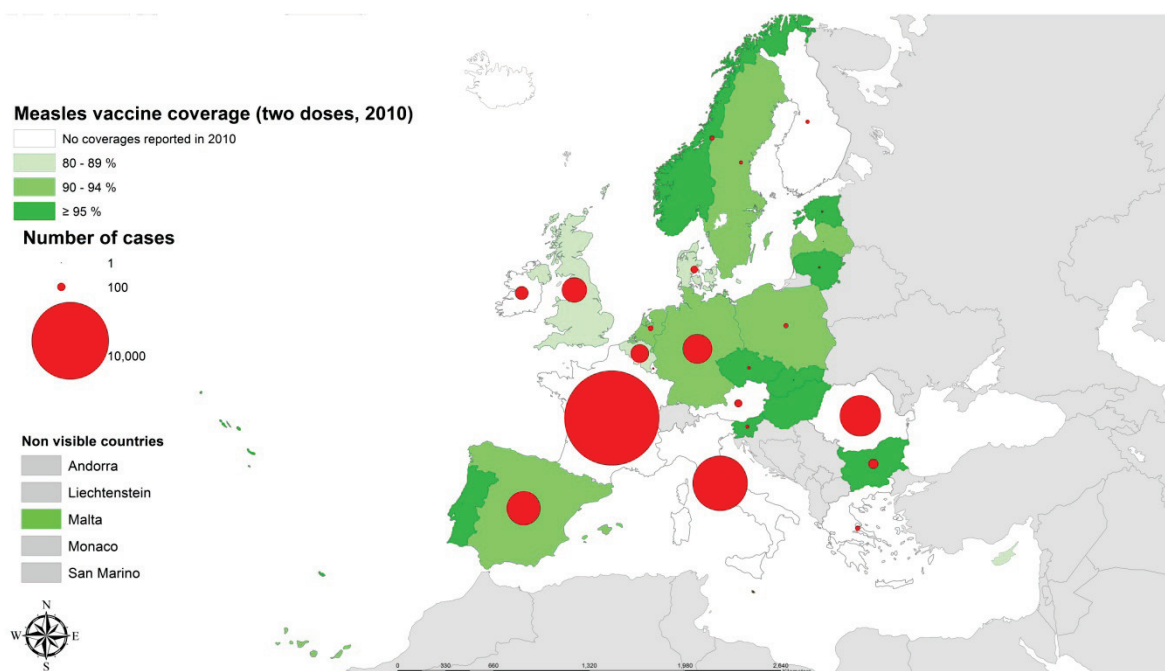


Source: TESSy.

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.

† Data missing from Germany for August– November and from Austria for November.

Figure 2. Distribution of measles cases in EU and EEA countries reported to TESSy for January–November 2011 (n=28 887) and two-dose measles vaccine coverage (2010 CISID*)

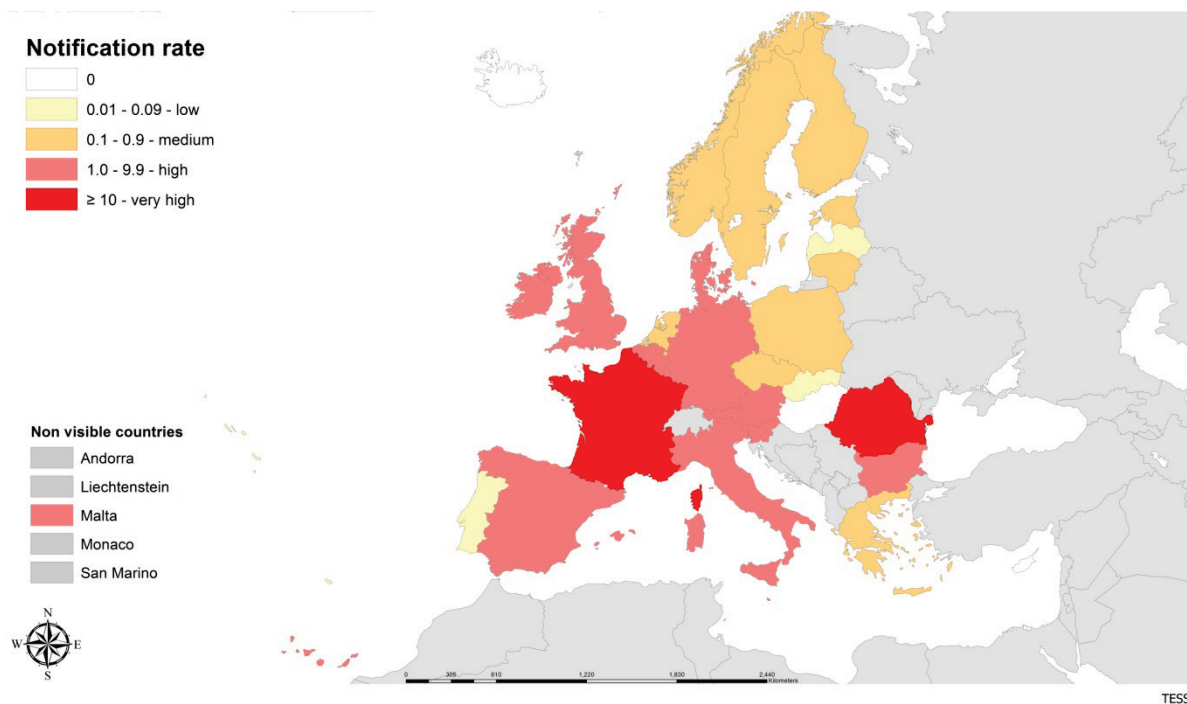


Sources: TESSy and CISID.

Germany did not report for August to November 2011, Austria did not report data for November.

*Coverage figures (%) are official national figures reported via the annual WHO/UNICEF Joint Reporting Form and WHO Regional Office reports (as of 1 September 2011).

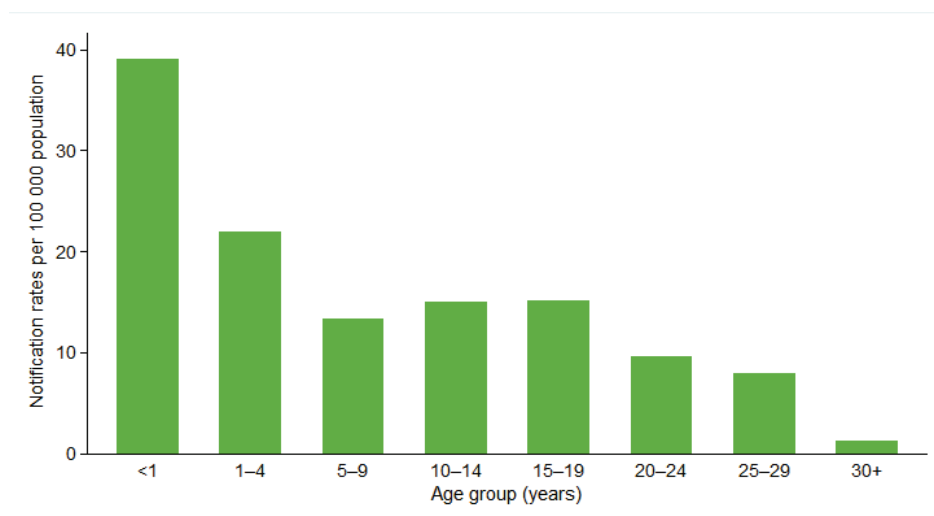
Figure 3. Distribution of notification rate (cases per 100 000 population) by country, EU and EEA countries, January–November 2011 (n=28 887)



Source: TESSy

Germany did not report for August–November 2011, Austria did not report for November.

Figure 4. Distribution of notification rates per 100 000 population by age group, January–November 2011, EU and EEA countries (n=28 369)



Source: TESSy.

Germany did not report for August–November 2011, Austria did not report for November.

Epidemic intelligence

ECDC continuously monitors measles transmission and measles outbreaks in the EU and Europe. Overall, measles transmission has been slow in the last eight months. The February to June peak transmission period is approaching and it is likely that the number of new cases will start to increase in endemic countries and countries with ongoing outbreaks unless effective control measures are put in place.

New outbreaks

Hungary

Source: *National Centre for Epidemiology (Epidemiológiai Információs Hetilap)*

In December 2011, Hungary effectively controlled an imported measles outbreak. The index case was infected during a visit to Romania where measles has been circulating for the last two years. The cluster consisted of five confirmed cases from three related ethnic Roma families. Two of the cases were unvaccinated, two had unknown vaccination status and one had been vaccinated abroad. Two of the cases were mothers, one of whom was pregnant. Vaccination status for the pregnant woman was unknown and the other woman was unvaccinated against measles. Since the measles vaccine is given in combination with rubella vaccine (MMR), both women have an increased risk of contracting rubella. This is of particular concern because of the rubella outbreak in Romania and the risk of congenital rubella infection (CRI).

Ukraine

Source: *State Sanitary and Epidemiological Services, Ukraine*

There is an ongoing outbreak of measles in Ukraine. As at 28 December 2011, the State Sanitary and Epidemiological Service reported that there had been 1 112 suspected cases in the western part of the country since onset in November 2011. One child is reported to have died from acute respiratory failure associated with the measles infection. According to the same press release, 1 382 cases of measles were notified in Ukraine during 2011.

The measles outbreak in Ukraine is not unexpected given the low and declining measles vaccination coverage in the country. In 2010, coverage for the first dose of measles-containing vaccine (MCV 1) was 56.1% and the coverage for the second dose was 40.7%. Ukraine experienced measles epidemics in 2001 (16 970 cases) and 2006 (42 724 cases). In June 2012, Ukraine will host the European Football Championship together with Poland. If the current measles outbreak develops into a major epidemic, then local measles transmission rates will be high during this mass gathering event.

Russia, Volgograd Oblast

Source: [Media](#)

An outbreak of measles has been reported from Volgograd oblast where a 15-month old child has died from measles related pneumonia.

Updates on outbreaks and endemic transmission

France

[No update since EMMO issue 6](#)

Romania

[No update since EMMO issue 6](#)

Topic of the month

Acute disseminated encephalomyelitis

There are three distinct neurological complications associated with measles:

- Acute disseminated encephalomyelitis (ADEM),
- Measles Inclusion Body Encephalitis (MIBE) and
- Subacute Sclerosing Panencephalitis (SSPE).

ADEM is also known as *acute post infectious measles encephalitis*, *acute measles encephalomyelitis* and *measles encephalitis*. By far the most common condition of the three, ADEM is an acute complication and occurs around the same period as the measles illness itself. ADEM is not uniquely associated with measles and several other viruses, including rubella, are known to cause the condition. It usually occurs on average four to six days after the onset of measles rash but symptoms can appear earlier or up to two weeks after the rash. The typical patient is someone recovering from measles. Presenting symptoms include sudden recurrence of high fever, motor deficits, altered consciousness, coma and sometimes convulsions. The presentation can be suggestive of meningitis but the findings in cerebrospinal fluid (CSF) are not specific and intrathecal measles virus (MV) and anti-measles IgG antibodies are absent. Diagnosis is by CT and MRI which reveal demyelination, believed to be caused by T-cell mediated destruction of oligodendrocytes. The pathology is similar to multiple sclerosis and it has been argued that ADEM is one presentation in a spectrum of autoimmune demyelinating diseases. Post-infectious ADEM differs from MS in that it is clearly linked to an infectious disease episode, it is monophasic, more than 50% of the patients recover fully and there is no relapse. The incidence and severity of post infectious encephalomyelitis varies between viruses. Rubella, as an example, is thought to be complicated by acute encephalomyelitis as often as 1 in 500 cases but the presentation is milder and the prognosis better than in ADEM caused by the measles virus.

MIBE is a rare subacute central nervous system complication following acute measles infection and is thought to chiefly affect immunocompromised hosts. Symptoms appear three to six months after the acute measles episode. Measles antigen is present in the brain, and the virus has been isolated directly from the brains of affected individuals. Unlike SSPE patients, MIBE patients do not have elevated neutralising antibodies in serum and cerebrospinal fluid. Symptoms include seizures, motor deficits and stupor, often leading to coma and death within a short period of time.

SSPE was described in [issue 5 of EMMO](#).

Table 3. Comparison between measles associated neurological complications

Disease	Immune competence	Incidence	Pathology	Time course	Outcome
Acute disseminated encephalomyelitis (ADEM)	Competent	1 per 1000 measles cases	Inflammation, demyelination. No evidence of MV replicating in brain	Acute onset 4-6 days after onset of rash. Monophasic symptoms, recovery within weeks.	Fatal in 10-30 % Complete recovery in 50%
Measles inclusion body encephalitis (MIBE)	Immuno-suppressed	Unknown	Inclusion bodies, replication of clonal MV in brain cells	Subacute onset within six months of the measles infection. Progressive degeneration	Fatal within 3 years after onset in close to 100% of cases
Subacute sclerosing pan-encephalitis (SSPE)	Competent	1 per 100,000 measles cases	Inclusion bodies, inflammation, replication of clonal MV in brain cells	Gradual onset on average 7 years after measles infection. Slow progression.	Fatal in close to 100% of cases

Adapted from *Fields Virology 5th edition*

How common is ADEM after measles?

One case of ADEM per 1 000 cases of measles is a frequency commonly quoted in textbooks and articles. These estimates are from the pre-vaccine era. Before the introduction of vaccination, England and Wales had on average 500 000 notifications of measles per year. In an attempt to quantify measles complications, researchers in 1963 requested follow-up data from notifying physicians. Report cards were sent out for 55 589 notified measles patients and the response rate was 95%. The results showed that the overall risk of acute encephalitis was 1.2 per 1 000 cases of measles. The risk was about the same for children aged between one and nine years, but increased four-fold among patients aged 10 years and above. There was no significant sex difference in the risk of complications, with the exception of seizure. This is probably explained by the generally higher risk of febrile convulsions among boys. There were no cases of encephalitis among children aged 0–11 months.

In 2011, ECDC was notified of 26 cases of measles encephalomyelitis. During the same period EU Member States reported close to 29 000 measles cases, translating into an ADEM frequency of 0.9 per 1 000 cases of measles. The observed rate is slightly lower than expected, particularly given that vaccination against measles, which was introduced in the 1980s in most countries, has resulted in a change in the age distribution of measles cases. Reduced exposure to measles and longer epidemic intervals have meant that a larger proportion of cases are now found among teenagers and young adults, who are at higher risk of developing ADEM according to pre-vaccine data.

Childhood immunisation programmes have dramatically reduced the incidence of measles infections in Europe since the 1960s and therefore also the number of ADEM and other complications. While pneumonia is the leading cause of measles-related deaths in poor countries this is not the situation in the EU where measles patients are well-nourished and have access to good-quality intensive care if they develop respiratory complications. Instead, acute disseminated encephalomyelitis has become a leading cause of measles-associated deaths in Europe. Needless to say, measles vaccination prevents measles, MIBE, SSPE and ADEM.

In 1962, the author Roald Dahl's daughter Olivia died from ADEM. Her death affected him deeply and he became an ardent supporter of measles vaccination. In 1986, he wrote an open letter entitled *Measles: A Dangerous Illness* which was published in an information leaflet on measles from the National Health Service UK. A transcript of the letter is available at <http://www.blacktriangle.org/blog/?p=715>.

Reporting on measles complications remains incomplete in TESSy and ECDC is interested in obtaining more information about acute disseminated encephalomyelitis (ADEM) and other neurological complications in the EU. A forum has been opened in the EPIS-VPD platform. Readers who do not have access to the EPIS-VPD platform and would like to contribute information on ADEM, MIBE or SSPE in the EU are welcome to contact Dr Niklas Danielsson: niklas.danielsson@ecdc.europa.eu.

Acknowledgements

ECDC would like to thank the Member States for reporting measles and other vaccine-preventable diseases in a timely manner in the TESSy database.

Related links

More information about measles is available on the ECDC website:

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

Information about vaccines and immunisation from the World Health Organization's Regional Office for Europe website is available at:

<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/>

Notes

- 1) The European Surveillance System (TESSy) uses a variable called 'date used for statistics', which is the date chosen by the country for reporting purposes. This may indicate the 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 and they can amend data which has already been uploaded retrospectively as more information becomes available. This means that the date of data retrieval from TESSy will have an impact on overall case numbers and the number of cases for given geographical areas and time periods may differ between EMMO issues. The date of data retrieval for this issue of EMMO was 19 December 2011.