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# Spotlight on measles 2010: Measles elimination in Europe – a new commitment to meet the goal by 2015

**I Steffens (eurosurveillance@ecdc.europa.eu)[1], R Martin[2], P L Lopalco[1]**
1. European Centre for Disease Prevention and Control (ECDC), Stockholm, Sweden
2. Communicable Diseases Unit, World Health Organization (WHO) Regional Office for Europe, Copenhagen, Denmark

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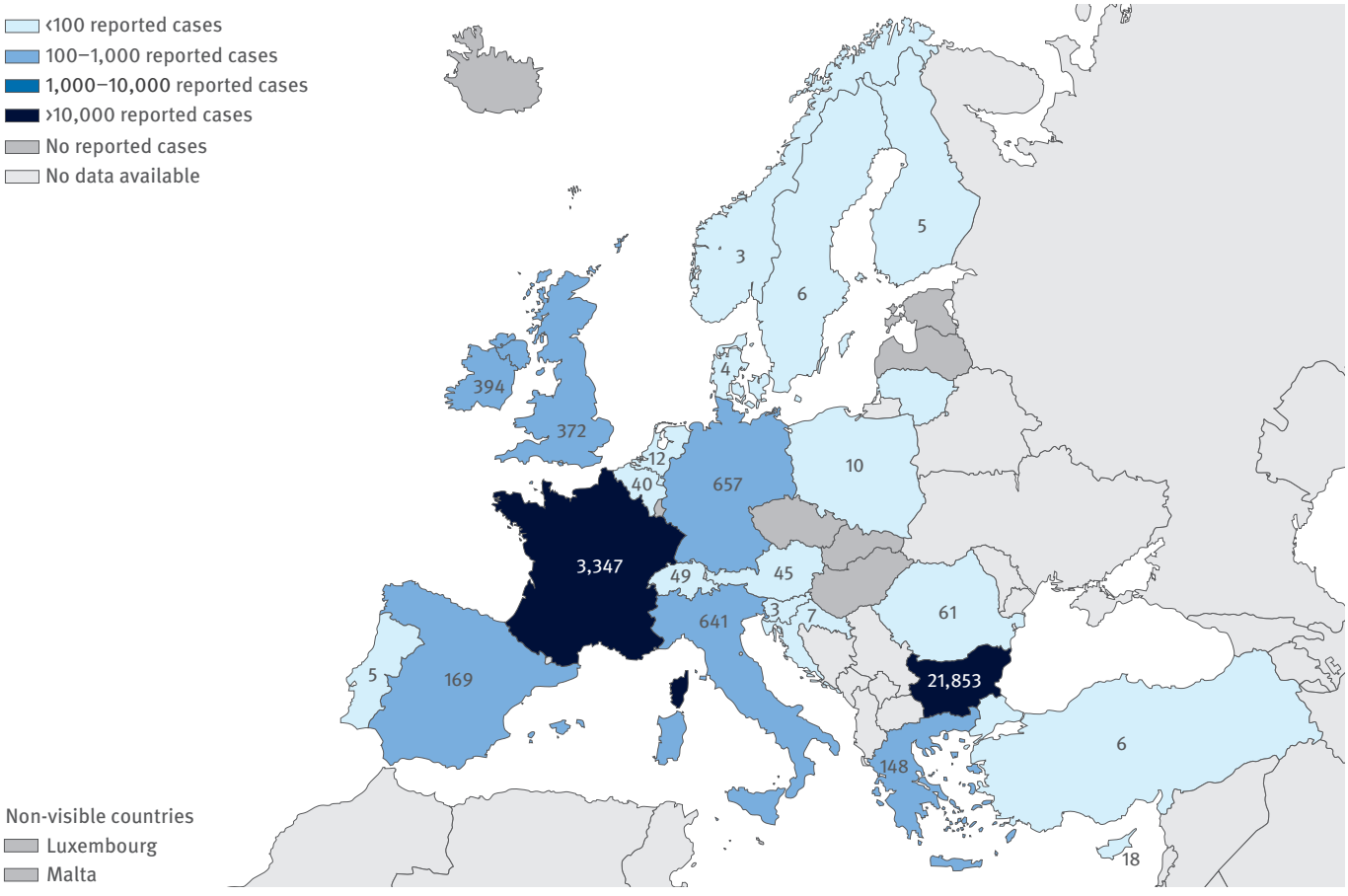
In September 2010, the 53 member states of the World Health Organization (WHO) European Region met in Moscow, Russia, and adopted a resolution to renew their commitment to the elimination of measles and rubella and the prevention of congenital rubella syndrome by 2015 [1]. While great progress has been made towards measles and rubella elimination in the Region, with some countries interrupting endemic transmission of one or both of the diseases, the public health community had to come to terms with the fact that 2010 will not be the year when measles and rubella elimination is achieved in the European Region. As experience from the Americas shows, it is technically feasible to eliminate measles with a defined strategy [2]. So why has the goal not yet been reached in Europe?

The reasons are manifold. In 2010, *Eurosurveillance* has put a spotlight on measles to mark this, tracked measles outbreaks in Europe, and highlighted the associated challenges. In 19 papers, mostly rapid communications, ongoing outbreaks have been described and their implications discussed. Together with earlier

## Figure

Number of measles cases reported by European Union and European Economic Area countries, January – October 2010 (n=27,795)




Source: [3].

reports in this journal from recent years, the comprehensive compilation of reports on measles shows that measles virus is freely circulating in Europe and is not confined to specific populations or countries. According to preliminary data from EUVAC.net, the European surveillance community network for vaccine preventable infectious diseases, covering January to October 2010 [3], measles outbreaks of various sizes occurred in a majority of European Union (EU) countries, Iceland and Norway, with 27,795 notified cases (Figure). Only eight EU countries reported zero cases in 2010. In addition, five countries (Bosnia and Herzegovina, Israel, Russia, Switzerland, Uzbekistan) among the WHO European Region countries experienced outbreaks between 2007 and 2010.

The Region will not achieve the initial goal of eliminating measles by 2010 because not all children are immunised on time, and some are never immunised. Many member states from the eastern part of the Region have conducted national supplementary immunisation activities to vaccinate population cohorts that were susceptible to measles and rubella viruses. Over 57 million persons have been immunised though these activities between 2000 and 2010.

This is, however, not enough. The compilation of *Eurosurveillance* papers provides further evidence of the known fact that there are areas or pockets of individuals not protected against the measles virus where coverage for two doses of a measles virus-containing vaccine is often below the 95% minimum needed for the elimination of the disease. These pockets are present throughout Europe and disease can propagate and spread within them, but the virus can also spread across country and regional borders with the movement of individuals. Therefore it is important to identify specific groups at risk for measles at local and national levels and to tailor health information and preventive measures specifically for these groups. In addition, one needs to be aware that it is not always possible to identify a specific group at risk [4,5]. While we see many outbreaks reported among Roma populations [6,7], Irish travellers [7] and anthroposophical [9,10] or religious communities [11,12], these populations are from different social backgrounds and there are different reasons why they are not vaccinated. Moreover, clustering in space of highly educated individuals who do not immunise their children put them at increased risk of disease if the virus is introduced into such a community. While immunisation has lead to a considerable reduction in disease over the years, there has been a shift in public perception from the risk, implications and severity of the disease to the safety of the vaccines.

Consequently, how do we increase measles vaccine coverage in the general population as well as among known risk groups? More information is needed in Europe on the severity of measles and secondary infections, including pneumonia and encephalitis, and the healthcare costs associated with the disease. In addition, information about the benefits of vaccination should be shared with politicians, healthcare professionals and parents.

If Europe is to meet the new measles elimination target of 2015, accelerated actions and innovative approaches need to be implemented by countries and the described challenges should be addressed so as not to jeopardise the goal. Besides targeted supplementary immunisation activities, which are not common practice in western Europe, catch-up vaccination campaigns among identified groups and individuals who are not immunised can dramatically close immunity gaps. Health professionals – such as doctors, nurses and midwives – play a critical role in achieving and maintaining high vaccination coverage. They need to be partners in strategies to promote vaccination and aide in closing immunisation gaps at any possible occasion, including reminding their clients and recalling children for vaccination. Ensuring that these healthcare providers have an appreciation of the benefits of vaccination against measles and a sound scientific knowledge of vaccinology, including information about the relatively few contraindications, is imperative. Lastly, renewing high-level political and societal commitment and ensuring appropriate resources are needed to reach the elimination goal by 2015. The Region cannot afford to lose ground on the substantial gains made to date.

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# Spotlight on measles 2010: Measles outbreak among travellers returning from a mass gathering, Germany, September to October 2010

**G Pfaff (guenter.pfaff@rps.bwl.de)[1], D Lohr[1], S Santibanez[2], A Mankertz[2], U van Treeck[3], K Schönberger[4], W Hautmann[4]**
1. Baden-Wuerttemberg State Health Office, District of Stuttgart Government, Stuttgart, Germany
2. National Reference Centre for Measles, Mumps and Rubella (NRC MMR), Robert Koch Institute (RKI), Berlin, Germany
3. NRW Institute of Health and Work, Düsseldorf, Germany
4. Bavarian Health and Food Safety Agency, Oberschleißheim, Germany

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**In September and October 2010, 13 primary measles cases were identified among unvaccinated persons aged between 9 and 32 years (median: 16.5) in 11 districts in Germany. All cases had attended meetings in Taizé, France. This outbreak illustrates the risk of long distance spread of infectious diseases associated with international mass gatherings, and underlines the importance of closing immunisation gaps against measles by vaccinating non-immune adolescents and young adults.**

## Introduction

Reports on measles outbreaks in Europe point to the importance of travelling non-immune adolescents and young adults in spreading the disease. Measles outbreaks related to short commutes [1], intermediate, and long distance travel [2,3] have been reported in the past. We describe an outbreak that affected predominantly adolescents and young adults who had recently participated in meetings in Taizé, France. Taizé is home to an ecumenical Christian community of Protestant and Catholic traditions, and is one of the most important sites of Christian pilgrimage. Meetings draw thousands of young people from around the world for contemplation, Bible study and communal work.

## Outbreak investigation

Between 13 and 21 September 2010, public health authorities in the German Laender of Baden-Wuerttemberg and North Rhine-Westphalia received notifications of six measles cases in adolescents who had recently returned from meetings in Taizé, France. This was communicated in a public health notice in the German epidemiological bulletin [4] in order to alert the public health community, and to identify any additional cases. A case was defined as clinically diagnosed or laboratory-confirmed measles infection notified in September or October 2010 in a person who had recently travelled to Taizé. French authorities were informed about the outbreak by the Robert Koch Institute via the Early Warning and Response System (EWRS). The Taizé Community was contacted via electronic mail, and designated a contact person who responded to emails and telephone calls with helpful information about the setting. All patients were contacted by local health authorities via telephone or in writing and were interviewed about their history of measles, immunisation with measles virus-containing vaccine, and details of travel and accommodation, where available. Diagnostic confirmation of cases was sought by laboratory detection of measles virus-specific IgM in samples from the patient or any secondary or tertiary case. Whenever possible, samples of blood, oral fluid and urine were collected and forwarded to the National Reference Centre Measles, Mumps, Rubella to further confirm the diagnosis by measles virus genotyping and to investigate transmission chains.

## Results

As of 31 October 2010, 13 primary cases who met the case definition had been identified from reports in Baden-Wuerttemberg (n=9), North Rhine-Westphalia (n=1), and Bavaria (n=3). Patients' ages ranged from 9 to 32 years (median: 16.5). Ten cases were female. None of the primary cases reported a history of clinical measles or having received measles virus-containing vaccine. Three cases were hospitalised for two – three days.

All 13 primary cases had travelled to Taizé from their various places of residence, either in youth groups (seven cases), with family (three cases) or a friend (one case). Cases 2 and 3 were persons who arrived in a bus chartered by their youth group. Cases 10 and 11 were siblings who had travelled in a private car with their parents. None of the other cases had shared the same means of transportation (e.g. charter bus, private car, hitchhiking), excluding a common source of exposure during outbound or return travel. Distances of the

cases' travel to Taizé by road varied between 390 km and 740 km (median: 520 km).

Periods of sojourn at Taizé ranged from six days to five weeks (the longest stay being for a volunteer helper, Case 4). Ten cases stayed for eight or nine days, mostly from Sunday to Sunday, which are the arrival and departure days recommended by the Community. Accommodation was in six – eight-bed dormitories (five cases) shared with youths from the same or other travel groups, in a family room (one case), or in their own tents that they brought with them (five cases); details of accommodation remain unknown for two cases.

Interviewed cases reported to have participated in a broad range of scheduled activities such as common prayers and meals, discussion groups, practical assignments, thematic workshops and informal gatherings at a common area, providing a picture of multiple possibilities for encounters with other persons in attendance. All primary cases were present on at least one weekend day between Friday 27 and Sunday 29 August 2010, and on a various number of days before or after this period (Figure 1).

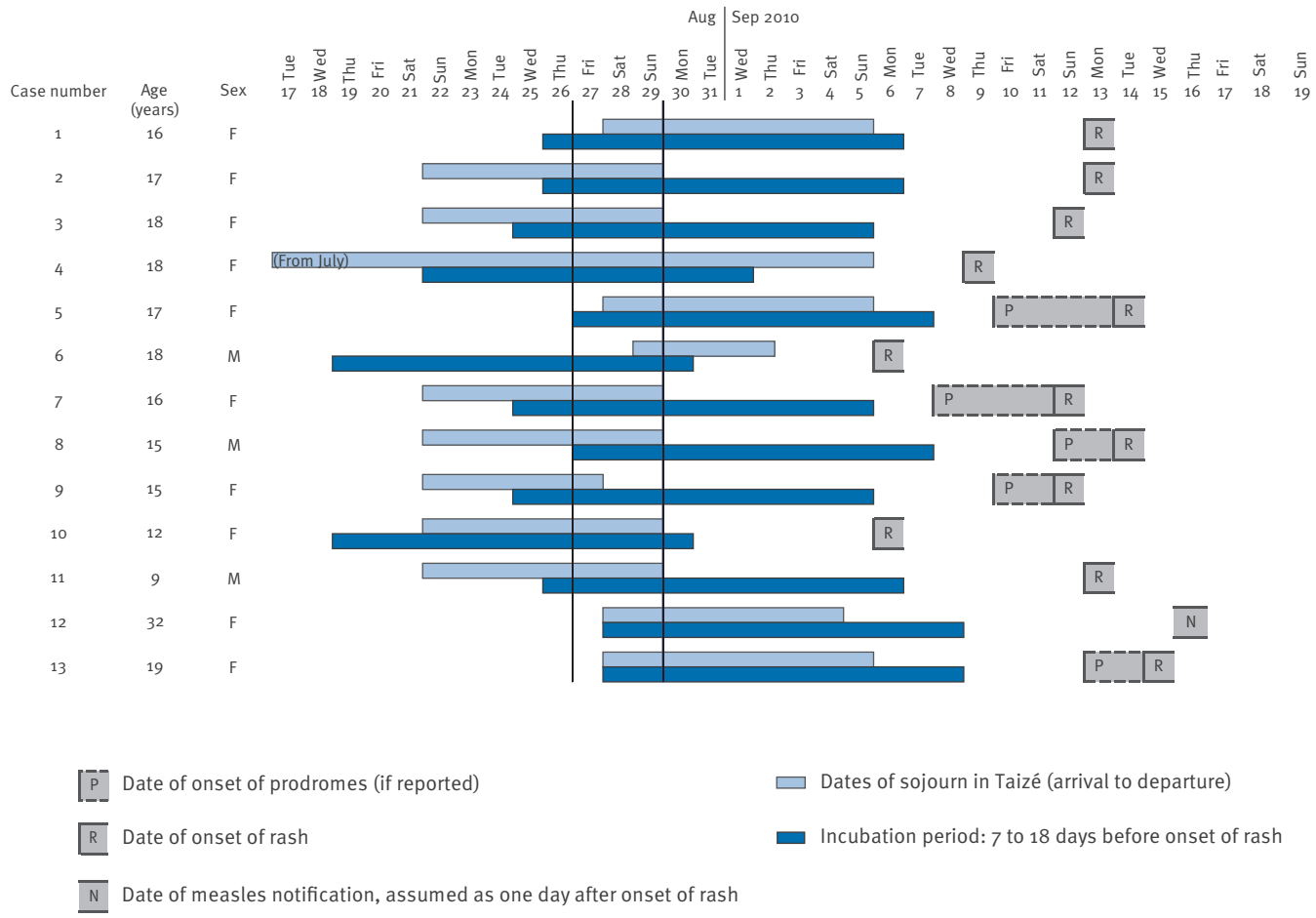
Eight of 13 primary measles cases did not cause secondary measles virus infections. Five primary cases resulted in 17 secondary cases (age range: 2–47 years, median: 15) and seven tertiary cases (age range: 5–18 years, median: 13). The persons affected were family members, friends and schoolmates, predominantly of a similar or younger age. In total, 37 measles cases could be attributed to this outbreak (Figure 2).

One 15-year-old secondary case had received a single dose of measles virus-containing vaccine in 2000. All other primary, secondary and tertiary cases were reported as unvaccinated.

The diagnosis of measles was laboratory confirmed by enzyme-linked immunosorbent assay (ELISA) in 10 primary cases by IgM or by a rise in IgG antibody level. Laboratory confirmation was obtained for two secondary measles cases who had been in contact with two clinical primary cases during the infectious period upon return. One primary measles case was

**Figure 1**

Dates of sojourn at Taizé, France, and of symptom onset of primary measles cases, Germany, August – September 2010 (n=13)



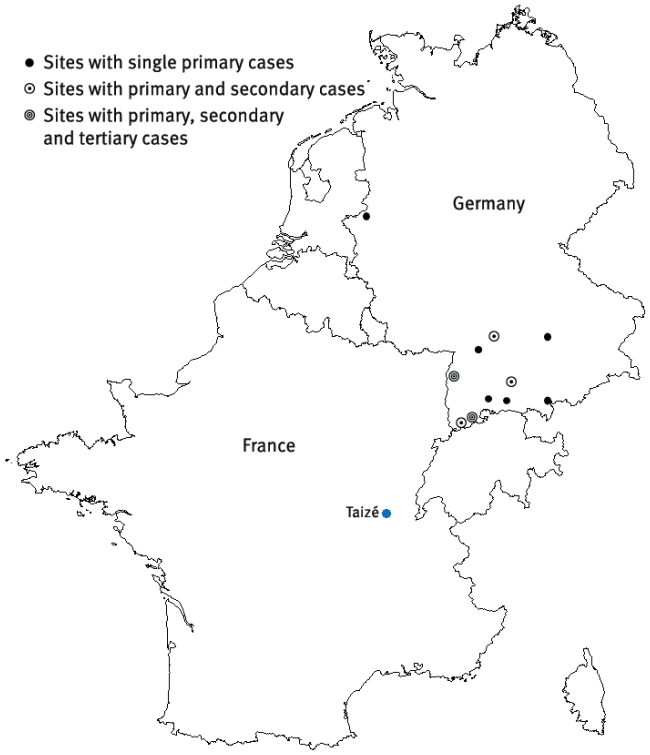

F: female: M: male.

The lines represent the weekend in which all primary cases were present in Taizé on at least one day.

diagnosed clinically. Two primary cases were not laboratory confirmed, but both were the infection source of at least one secondary case with laboratory-confirmed measles.

**Figure 2**

Geographical spread of measles cases, Germany, September – October 2010 (n=37)




The measles viruses isolated in Germany from mid-September until end of October 2010 were compared with prototypic measles viruses representing the predominant D4 sub-variants in western Europe.

Genotyping was performed for Case 1 (Villingen-Schwenningen.DEU/37.10) who had been infected in Taizé and for five secondary cases who had been in contact with either Case 3 (n=3), Case 6 (n=1) or Case 8 (n=1) (Figure 3). Phylogenetic analysis was based on a 456-nucleotide sequence encoding the C-terminus of the measles virus Nucleocapsid-protein. All five cases analysed showed the genotype D4 variant 'D4-Manchester' (MVs/Manchester.GBR/10.09[D4], GenBank accession number: GQ370461).

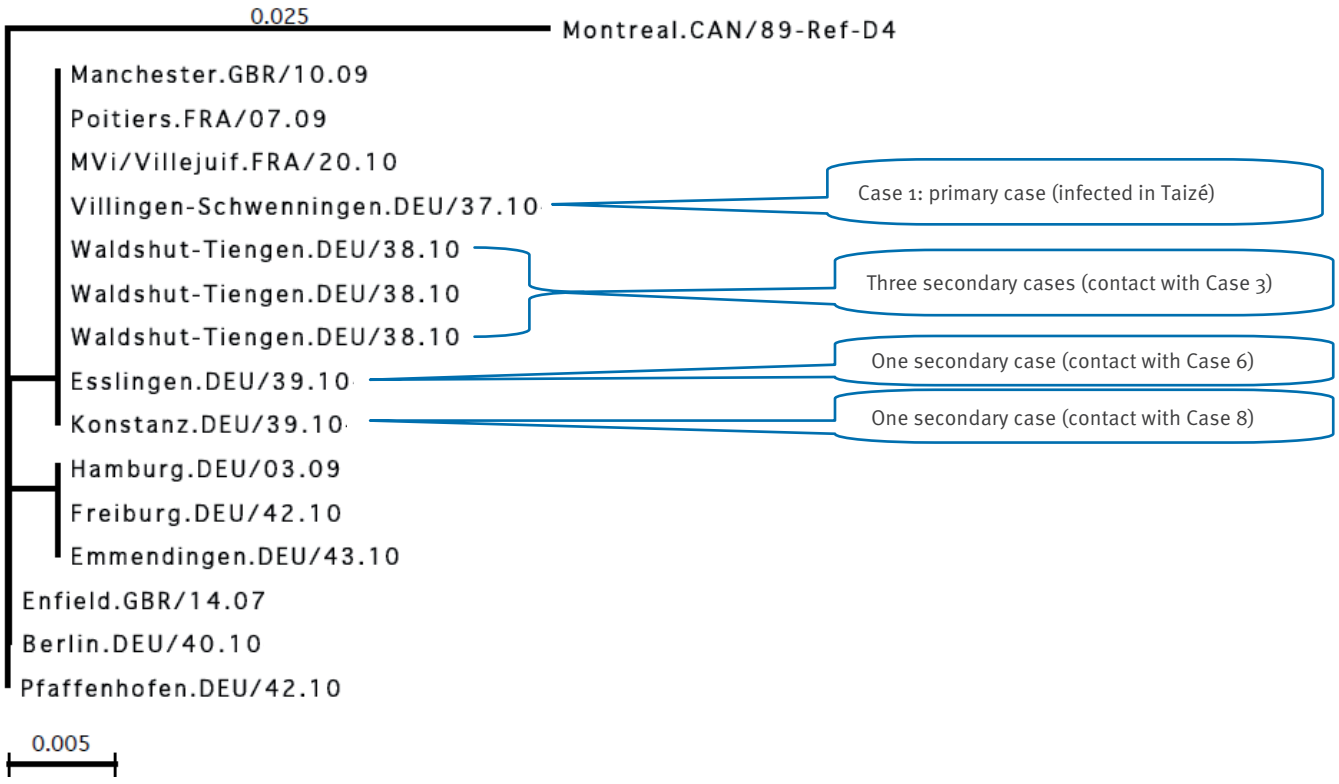
This suggests that the German cases with a suspected link to the meetings in Taizé belong to the same chain of measles virus transmission. Occurrence of measles virus variant D4-Manchester in western and central parts of Europe from 2008 onwards is reported in the GenBank and the MeaNS database. In 2010, this variant was identified several times in France [5].

## Discussion

In Europe, measles outbreaks have been reported to occur in, among other settings, anthroposophical communities [6], minority populations [7] and unvaccinated

**Figure 3**

Phylogenetic relationships within measles virus genotype D4, measles outbreak, Germany, September – October 2010 (n=6)




The genotypes of the virus from the six cases are indicated in boxes. The other genotypes listed are shown for comparison (from GenBank).

preschool children [8]. In the United States where elimination has been achieved, the challenges to maintain elimination are considered to include outbreaks of measles resulting from travel to countries where measles is still endemic, frequent international travel and persons who remain unvaccinated because of personal belief [9].

This multilocal outbreak illustrates the risk of exposure to measles virus at mass gatherings while measles elimination has not yet been achieved. In addition, it underlines the potential for long-distance spread of measles virus by mobile, non-immune adolescents and adults. We consider it likely that additional measles cases may have occurred among persons who visited Taizé at the end of August 2010 and returned to other destinations, where the possible source of exposure went unnoticed or remains unpublished.

In 2008, the nationwide measles vaccination coverage for German children at the time of their school entry examination (five to six years) was 95.9% for the first dose, and 89% for the second dose, with considerable geographical variation [10]. While measles vaccination coverage among younger children is on the rise, it should not be forgotten that immunisation coverage in older age cohorts may not yet have reached levels required for measles elimination.

In conclusion, measles may be reintroduced by returning travellers or visitors who have been infected with the virus. Public health policy should recognise the importance of proactive information of adolescents and young adults in order to address gaps in individual measles immunity, and by encouraging the vaccination of non-immune adolescents and young adults.

## Acknowledgements

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# Spotlight on measles 2010: Measles outbreak in the Provence-Alpes-Côte d'Azur region, France, January to November 2010 - substantial underreporting of cases

**C Six (Caroline.SIX@ars.sante.fr)[1], J Blanes de Canecaude[2], J L Duponchel[2], E Lafont[2], A Decoppet[2], M Travanut[2], J M Pingeon[2], L Coulon[2], F Peloux-Petiot[2], P Grenier-Tisserant[2], J C Delarozière[3], F Charlet[2], P Malfait[1]**

1. Regional Office of the French Institute for Public Health Surveillance (Cire Sud), Marseilles, France
2. Regional Health Agency (Agence régionale de santé, ARS) of Provence-Alpes-Côte d'Azur, Marseille, Avignon, Digne-les-Bains, Gap, Nice, Toulon, France
3. Interregional infection control coordinating centre (CClin), Marseilles, France

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**In 2010, the Provence-Alpes-Côte d'Azur region in France has been experiencing a measles outbreak with at least 310 cases among the general population, which included 28 cases among healthcare workers (9% of all reported cases). There is, however, substantial underreporting in the notification systems of cases in both populations.**

## Background

In the Provence-Alpes-Côte d'Azur (PACA) region in France, the measles virus currently circulates in the general population [1]. Outbreaks have occurred in well-defined groups such as nomadic minorities and Roma communities that are not fully vaccinated, in childcare centres, schools, universities, healthcare facilities and a prison. Hospitals have been particularly affected, as many measles cases visited emergency units or were admitted to hospital with complications.

In France, clinicians and microbiologists are requested to report suspected measles cases immediately to the regional public health authority (Agence régionale de santé, ARS), through the national mandatory notification system. The French Institute for Public Health Surveillance (Institut de veille sanitaire, InVS) collects and analyses this information. Where there is nosocomial infection, healthcare facilities are requested to notify the interregional infection control coordinating centres and the Agence régionale de santé, which in turn inform InVS, through the national early warning system [2]. As described fully elsewhere [1,2], the reporting includes the nature of the event, its main characteristics, as well as investigations and control measures carried out, and assistance can be requested.

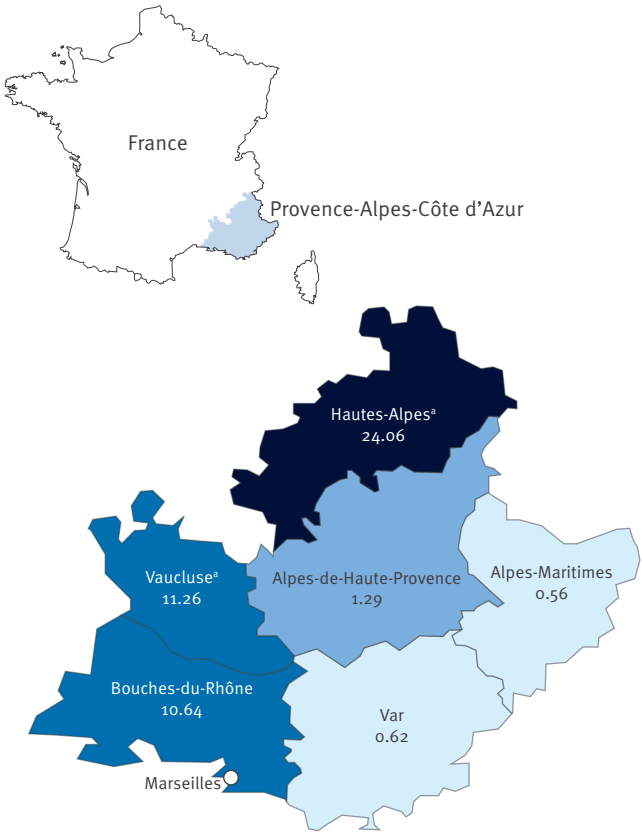
## Outbreak description

### General population (preliminary data)

In the PACA region (4,780,986 inhabitants) increased measles transmission continued to be recorded in 2010. We included in our analysis the notified clinical and laboratory-confirmed cases with a date of rash onset between January 2008 and November 2010 (preliminary data). A confirmed case can be: (i)

**Figure 1**

Incidence of reported measles cases, by district, Provence-Alpes-Côte d'Azur region, France, January – November 2010




The numbers shown are the incidence rates per 100,000 population.

[a] Districts with active case finding.

Source : Regional Health Agency (Agence régionale de santé, ARS) of Provence-Alpes-Côte d'Azur, France.

laboratory-confirmed, by detecting either measles IgM antibodies or measles virus nucleic acid in serum or oral fluid using reverse transcription-polymerase chain reaction (RT-PCR), or (ii) epidemiologically confirmed, when a link with a laboratory-confirmed case is proven. Case definitions for measles are detailed on the InVS website [3]. As of 30 November, 384 measles cases had been reported (Figure 1). In 2008 and 2009, 51 and 44 cases were reported.

In our analysis, 74 of the 384 cases reported in 2010 were excluded because detailed data were unavailable. The majority of cases, 193 of the remaining 310, were reported by the Bouches-du-Rhône district (1,916,494 inhabitants) (Figure 2); 126 of the 193 cases were reported by Marseilles (852,395 inhabitants), the biggest town of the region. In the PACA region, the incidence increased from 1.07 per 100,000 population in 2008 to 6.37 per 100,000 population in 2010. The incidence in the Bouches-du-Rhône district reached 10.64 per 100,000 population and in Marseilles alone 14.78 per 100,000 population in 2010 (Figure 3). In France as a whole, 5,221 measles cases were reported between 1 January 2008 and 31 August 2010: the incidence rates in the general population increased from 0.95 per 100,000 population in 2008, 2.3 to 4.84 per 100,000 population in 2010 [1,3].

The male:female ratio of the 310 measles cases in the PACA region was 1:2. The disease affected all ages, but the people most affected were those under one year (10% of cases, n=31) and 20–29-year-olds (25% of cases, n=74). The highest incidence rate was observed in children under two years (51.07 per 100,000 population) (Figure 4).

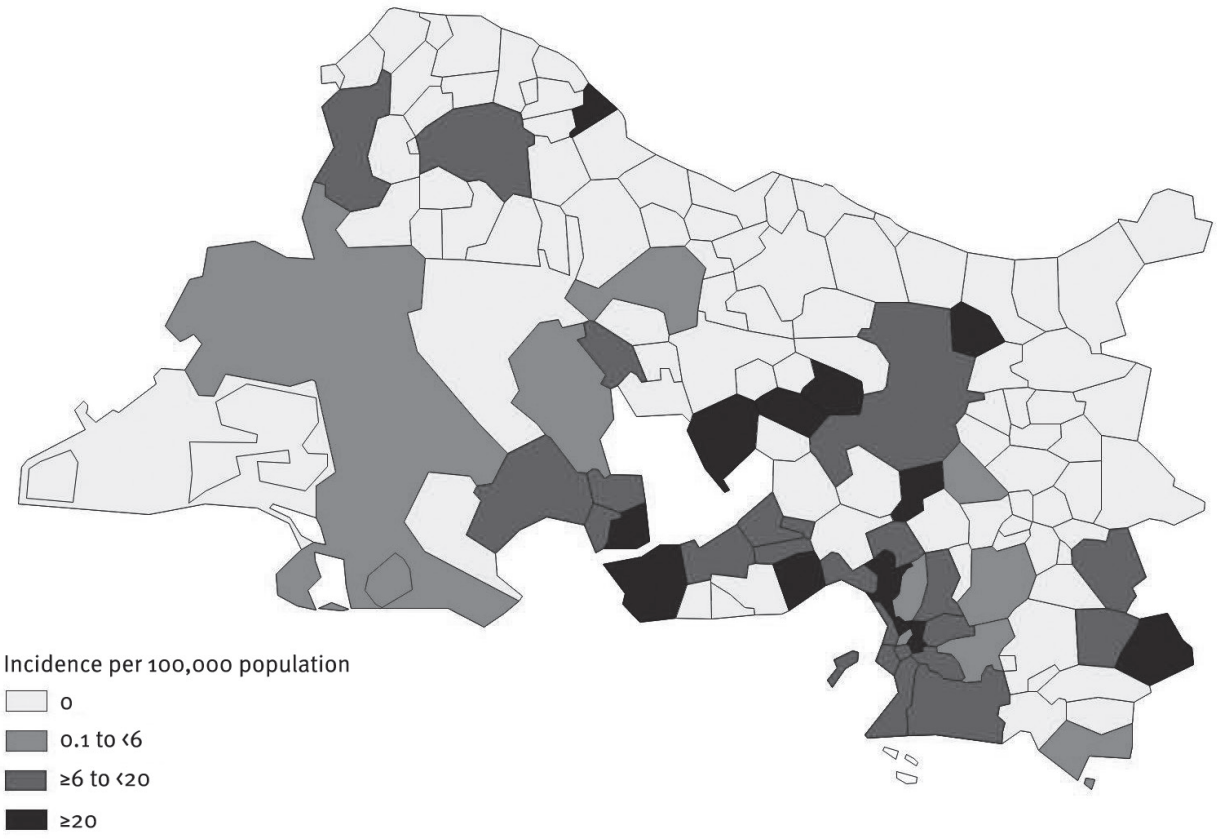
Measles vaccination status was available in 81% of cases (n=250): 204 (82%) were unvaccinated, 37 (15%) had received a single dose of measles-mumps-rubella (MMR) vaccine, four (2%) two doses and five (2%) unspecified number of doses.

The proportion of laboratory-confirmed cases was 58% (n=180) and the D4 genotype was identified in 13 samples.

Information on hospital admission was available for all cases except one; 98 (32%) were admitted to hospital; of these, 29 were hospitalised in Marseilles.

**Figure 2**

Incidence of reported measles cases in Bouches-du-Rhône district, Provence-Alpes-Côte d'Azur region, France, January – November 2010




Source : Regional Health Agency (Agence régionale de santé, ARS) of Provence-Alpes-Côte d'Azur, France.

A total of 34 cases had complications: 20 of these were in cases who had been hospitalised. There were no complications in infant cases, 11 cases with complications were aged 1–9 years, nine cases were 10–19 years and 14 were older than 20 years. Acute encephalitis was reported in an unvaccinated six-year-old case and pneumonia in 23 cases. No measles-related deaths were reported.

## Nosocomial infection of healthcare workers (preliminary data)

In the PACA region, healthcare workers were particularly affected by measles, with 28 cases reported in 2010 (as of 30 November) through the mandatory notification system, representing 9% of all cases in the general population. Four cases were nurses, four were medical doctors, 11 were students (two nursing students and nine medical students) and seven were other types of healthcare workers; for two cases, their type of healthcare work was unspecified. Of these 28 cases, 23 were reported from Bouches-du-Rhône district; 15 of the 23 were from Marseilles. Only two of the 28 cases were reported through the early warning system.

**Figure 3**

Incidence of reported measles cases in Provence-Alpes-Côte d'Azur region, France, by year, January 2008 – November 2010

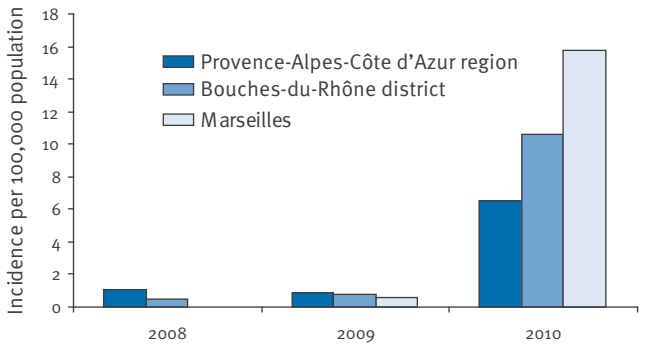
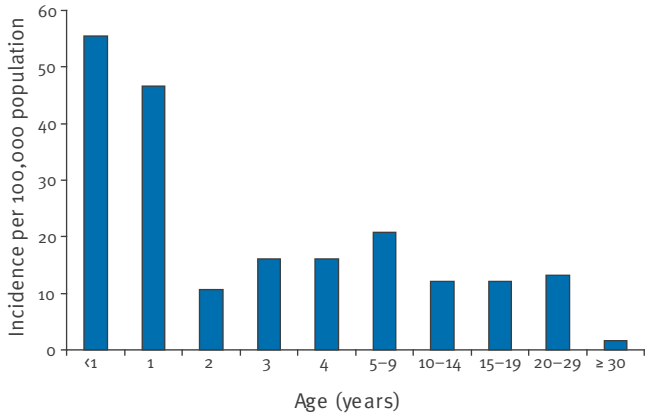



**Figure 4**

Incidence of reported measles cases in Provence-Alpes-Côte d'Azur region, France, January 2008 – November 2010




The male:female ratio of the 28 cases was 0:6. A total of 18 cases were aged 20–29 years and 10 were older than 30 years (the eldest was 55 years).

Measles vaccination status was known for 22 of the cases: 14 were unvaccinated, six had received a single dose of vaccine and two had had two doses.

Nine cases were admitted to hospital, of whom six were hospitalised in Marseilles.

## Control measures

Several control measures were implemented by the Agence régionale de santé according to the national guidelines [4]. They included providing information to the general public and providing targeted information to healthcare professionals, by individual letter to general practitioners and heads of nursing schools in the Bouches-du-Rhône district. The communication was focused on vaccinating the general population and healthcare workers according to the national immunisation schedule and proposed post-exposure vaccination or immunoglobulin for people at high risk for severe disease as a result of measles virus infection.

During measles transmission among healthcare workers and/or hospitalised patients, most healthcare workers implemented barrier measures, and unvaccinated or non-immune healthcare workers and patients' contacts were vaccinated locally. Contacts outside the hospital, relatives and external patients that could have been infected by a case were identified, informed and invited to contact their general practitioner in order to ascertain their vaccination status and to complete their vaccinations if necessary.

## Discussion

A high number of measles cases has been reported in 2010 in the PACA region, in particular in Marseilles. However, the number of measles cases reported is less than the true number of cases, for various reasons: cases were excluded from the analysis because of missing data, and clinicians and microbiologists did not report all cases to health authorities. InVS demonstrated that during investigations of measles outbreaks in 2008, cases reported through the national mandatory notification system represented only 10% of all detected cases [5]. Often, only the first case in a household is reported: any secondary cases are not. The high proportion of hospitalised cases from the general population seems to reflect a better compliance in notification by their health professionals than by general practitioners.

In healthcare facilities, underreporting through mandatory notification and early warning systems is the main reason for underestimating the number of cases. For example, more cases have been identified by the public hospitals of Marseilles than have been declared to the Agence régionale de santé [6,7].

The low measles immunisation coverage among the general population and healthcare workers, who can infect vulnerable persons who they treat, facilitates the expansion of the outbreak in the region [8]. In 2007, among children aged 24 months, the vaccination coverage (one dose) reached 92% in the Alpes-Maritimes district, 89% in the Bouches-du-Rhône district and 87% in Var district (no data are available from the other districts of the PACA region); at national level, it was 90% [9]. Clinical diagnosis of measles cases must be better understood by general practitioners, and case notification and the implementation of preventive measures, including catch-up and post-exposure vaccinations, must be improved.

Insufficient implementation by healthcare workers and general practitioners of the current recommendations issued by the French health authorities [4] and unsuitable control measures in some healthcare facilities are the cause of measles transmission in healthcare workers and hospitalised patients [8]. Awareness among the healthcare workers, particularly occupational medical staff, must be raised to implement specially adapted preventive and control measures in hospitals units, especially in emergency rooms and wards where all patients admitted to hospital with rash and fever must be isolated and strict infection control procedures applied before diagnostic confirmation. Preventive measures need also to focus on improving the hospital's knowledge of the serological status of their patients and on vaccinating them if they are not immunised, because immunisation is the only reliable protection against nosocomial spread of measles [10].

## Acknowledgements

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# Spotlight on measles 2010: Increased measles transmission in Ferrara, Italy, despite high vaccination coverage, March to May 2010

**M Cova[1], A Cucchi[2], G Turlà[2], B Codecà[2], O Buriani[1], G Gabutti (gbtgnn@unife.it)[2]**
1. Public Health Department, Local Health Unit, Ferrara, Italy
2. Department of Clinical and Experimental Medicine, University of Ferrara, Ferrara, Italy

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**We report an increase in the incidence of measles in a population with consistently high and improving immunisation coverage in Ferrara province, northern Italy. During the first six months of 2010, 19 cases were confirmed, 10 of which were hospitalised. General practitioners, paediatricians and local healthcare authorities were alerted about the outbreak and asked to notify all suspected cases. We need to further increase immunisation coverage and to maintain and implement the monitoring system.**

## Background

In Italy measles vaccination is recommended with a two-dose schedule, with the first dose of measles-containing vaccine administered to children between 12 and 15 months of age and the second dose at the age of five to six years. The combined measles-mumps-rubella (MMR) vaccine was included in the national vaccination schedule in 1999, and has been provided free-of charge to all children since 2002.

Thanks to the implementation of surveillance plans and interventions to improve vaccination coverage, the incidence of measles in Italy has decreased considerably in the past decades from 150 per 100,000 0-14 year-old inhabitants in the 1960s to 15 in 2000 and 1 in 2006 [1-2]. At the same time, the national vaccination coverage at the age of 24 months increased significantly from 84% in 2003 to 90% in 2006, although with differences between regions [3]. Since 1998, the surveillance on vaccination coverage rates at national level has collected data on immunisations in newborns by a cluster sampling method. The same methodology is used to evaluate vaccination coverage rates in 16 year-old adolescents. Thus, national data on vaccination coverage for the first dose in children over two years of age and for the second dose are not available [4]. Despite recent improvements, the vaccine coverage in Italy, similar to other European countries, remains below the threshold suggested by the World Health Organization to reach elimination of the disease, i.e. country-wide at least 95% of children at the age of two years [5]. Epidemic outbreaks in several Italian regions (Piedmont, Lombardy and Emilia-Romagna) have been described in the past three years [6], an indication that measles virus is circulating. Therefore, specific preventive interventions should be strengthened. Here we describe a measles outbreak that occurred in the first

**Figure 1**

Coverage with first dose of measles-containing vaccine by the age of 24 months in Ferrara province and Emilia-Romagna region, Italy, 1999-2008

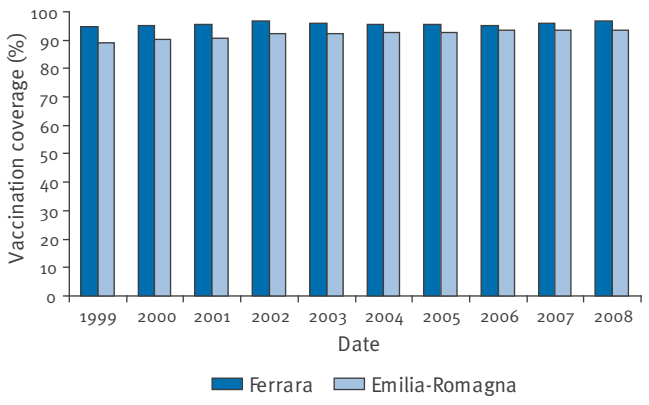
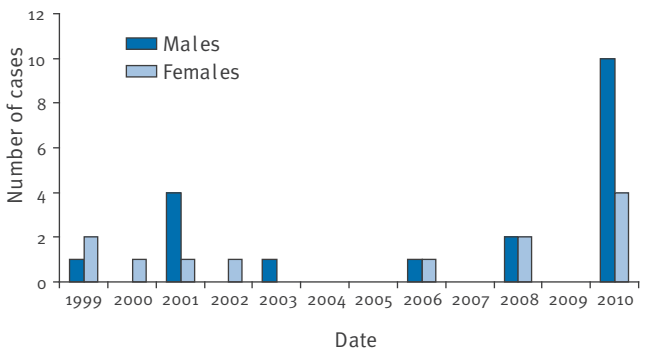



**Figure 2**

Laboratory-confirmed measles cases by sex, Ferrara province, Italy, 1 January 1999–30 June 2010 (n=31)



six months of 2010 in the province of Ferrara, in the Emilia-Romagna region, north-east Italy, an area with historically high immunisation coverage rates [7].

## Epidemiological update and outbreak description

Ferrara had a population of approximately 360,000 inhabitants, and 2,813 newborns in 2009 [8]. According to national legislation [1] and the European case definition for measles [9], the identification of a case requires the detection of measles-specific IgM antibodies in the serum of a person notified with clinical symptoms of measles who had no record of recent vaccination. Since 1999, only notified and laboratory-confirmed (IgM-positive) cases have been reported by the healthcare workers in the local health unit to the regional information system of infectious diseases in Emilia-Romagna. Epidemiologically linked cases are notified but not reported to the information system. For each case, this database collects personal data (age, sex, place of residence), clinical information (if complications or hospitalisation occurred) and vaccination status.

In 1999 the vaccine coverage at 24 months of age was 94.9% in Ferrara province, and it has increased over the years, reaching in 2008 96.7% with one dose at 24 months of age and 91.1% with two doses at six years of age. The vaccine coverage has been higher in Ferrara than in the region of Emilia-Romagna as a whole since 1999 (Figure 1) [7]. Over the past ten years the measles incidence has been stable in the province and transmission has ceased spontaneously, indicating that vaccination coverage has been high enough to break the chain of infection.

Only 17 laboratory-confirmed cases of measles were observed between 1999 and 2009, with between 0 and 5 cases per year (Figure 2). During the first six months of 2010, however, 23 cases were reported, 14 of whom were laboratory-confirmed and are shown in Figure 2. Five cases were epidemiologically linked to one of the confirmed cases but not laboratory-confirmed and hence not included in the regional information system of infectious diseases. The remaining four cases were neither laboratory-confirmed nor linked and are not further analysed here.

General practitioners, paediatricians and local healthcare authorities were alerted about the outbreak and asked to notify all cases with symptoms suggestive of measles. The following case classification was used:

- *Suspected*: a person with any febrile illness accompanied by rash;
- *Probable*: a case that met the clinical case definition [9], had non-contributory or no serological or virological test results, and was not epidemiologically linked to a confirmed case;
- *Confirmed*: a case that was laboratory-confirmed or that met the clinical case definition and is epidemiologically linked to a confirmed case. A laboratory-confirmed case did not need to meet the clinical case definition.

**Table**

Characteristics of measles cases, Ferrara province, Italy, 1 January–30 June 2010 (n=19)

| Case | Age | Sex | MMR vaccination status | Hospitalisation | Complication | Epidemiological link |
|---|---|---|---|---|---|---|
| 1 | 16 years | F | Unvaccinated | No | No | No (index case) |
| 2 | 48 years | F | Unvaccinated | Yes | Pneumonia | No |
| 3 | 44 years | M | Unvaccinated | Yes | No | No |
| 4 | 12 months | M | Unvaccinated | No | No | No |
| 5 | 19 years | M | Unvaccinated | Yes | No | No |
| 6 | 11 months | M | Unvaccinated | No | No | No |
| 7 | 11 years | M | Unvaccinated | Yes | No | No (index case of the linked cluster) |
| 8 | 42 years | F | Unvaccinated | Yes | No | No |
| 9 | 11 years | F | Unvaccinated | No | No | Yes (primary school) |
| 10 | 20 years | M | Unvaccinated | Yes | No | No |
| 11 | 54 years | F | Unvaccinated | Yes | No | No |
| 12 | 49 years | M | Unvaccinated | Yes | No | No |
| 13 | 10 years | M | Unvaccinated | No | No | Yes (primary school) |
| 14 | 14 months | M | Unvaccinated | Yes | No | No |
| 15 | 36 years | M | Unvaccinated | No | No | No |
| 16 | 10 years | F | Unvaccinated | No | No | Yes (primary school) |
| 17 | 5 years | F | Vaccinated[a] | No | No | Yes (primary school) |
| 18 | 13 months | F | Vaccinated[a] | No | No | Yes (sister of number 17) |
| 19 | 34 years | M | Unvaccinated | Yes | No | No |

M: male; F: female;

[a] Vaccination with one single dose of MMR vaccine, coincidentally administered three to five days before the onset of exanthema.

Laboratory criteria for diagnosis were a positive serologic test for measles immunoglobulin M antibody, or significant rise in measles antibody level by any standard serologic assay, or isolation of measles virus from a clinical specimen [9]. A linked case was defined as a person who showed clinical signs of disease following close contact with a confirmed case during infectious period [10].

The index case, notified on 5 March, was a 16-year-old unvaccinated girl. She had no close contact with any other case nor a history of travel in areas where recent outbreaks were described. Therefore, a clear source of infection could not be identified for this case. The five epidemiologically linked cases formed a cluster notified in the period from 9 to 29 April. An 11-year-old boy was identified the index case; all cases attended the same primary school, except for a 13-month-old girl, the sister of a pupil.

The mean age among the 19 confirmed cases was 21.7 years (range 11 months to 54 years) (Table). The mean delay between the onset of the exanthema and the notification to the authorities was 3.3 days. Ten patients required hospitalisation. One patient had a complication (pneumonia). Two of the 19 cases had been vaccinated against measles with one single dose of MMR vaccine, three to five days before the onset of exanthema. Considering the incubation period for measles of 8-12 days, these two patients probably acquired the infection before immunisation and were in the incubation period at the time of vaccination [11].

## Control measures

In accordance with current legislation [1], vaccination of the cases' families and other contacts has been proposed. Moreover, as a measure to control the spread of the disease, students and teachers who had no history of measles vaccination or illness were encouraged to not to attend school until there were no more cases. Recreational and work activities of each case were also recorded. General practitioners doctors, paediatricians and local healthcare authorities were requested to rapidly notify all patients with clinical symptoms suggestive of measles and to confirm the diagnosis by appropriate laboratory tests. All hospitalised patients suspected to have measles were isolated and no nosocomial transmission has been seen. No further cases were reported after 12 May. It is therefore likely that the measles outbreak has been contained through implementation of adequate control measures by the department of public health of the local healthcare unit of Ferrara.

## Discussion

In 2005 the World Health Organization (WHO) had planned the elimination of measles in Europe no later than 2010 [12], but this deadline has recently been extended to 2015 [13]. In order to achieve this target, a minimum of 95% vaccination coverage with at least one dose in children at the age of two years should be reached. However, several outbreaks that occurred in recent years in Italy and other European countries are an indication that this goal has been only partially achieved. Historically, immunisation coverage in the province of Ferrara has been high, and in 1999 a vaccine coverage of 94.9% at the age of 24 months was recorded. This coverage was maintained over the following years, but the present outbreak shows how difficult it is to reduce the incidence of measles to less than one in 100,000 live births, even in an area with high vaccine coverage. It is noteworthy that the cases reported here did not give rise to large outbreaks, indicating that, together with control measures, population immunity was high enough for the outbreak to die out.

However, as long as the measles virus is imported from neighbouring areas or from other countries, a population will not be entirely without measles cases because the number of susceptible people will accumulate over time and will sustain smaller or larger outbreaks depending on how large and how concentrated the accumulated susceptible population is. Most measles outbreaks in Europe in recent years have started as a result of importation of measles from another European country, and Europe has on several occasions exported measles to measles-free areas of the world such as the Americas.

It is therefore necessary to make an extra effort to further increase immunisation coverage and to maintain and implement the monitoring system, especially in terms of quickness, completeness and accuracy of reporting.

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# Spotlight on measles 2010: An ongoing outbreak of measles in an unvaccinated population in Granada, Spain, October to November 2010

**B López Hernández[1], J Laguna Sorinas[2], I Marín Rodríguez[2], V Gallardo García[3], E Pérez Morilla[3], J M Mayoral Cortés (josem.mayoral.sspa@juntadeandalucia.es)[3]**
1. Andalusian Health Service, Granada, Spain
2. Provincial Health Office, Regional Ministry of Health, Granada, Spain
3. Regional Ministry of Health of the Government of Andalusia, Seville, Spain

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**On 13 October 2010, the Andalusian Epidemiological Surveillance Network was notified of one case of measles. By 15 November 2010, 25 confirmed cases of measles had been reported from Granada, southern Spain, of whom 22 were unvaccinated children under the age of 15 years. This ongoing outbreak involved a subpopulation with low vaccination coverage and parents with ideological objections to vaccination. As of 7 December the number of cases has reached 59.**

## Background

In Andalusia, Spain, a Plan of Action for Measles Elimination was approved in 2001 [1], following the recommendations of the World Health Organization (WHO) [2]. This Plan was created with the objective of eliminating indigenous measles by the year 2005, but elimination has not yet been achieved. The two strategic goals of the Andalusian Plan were to enhance the epidemiological surveillance system to facilitate early detection of cases and transmission control, and to increase the vaccination coverage in children in order to improve population immunity.

The measles-mumps-rubella (MMR) vaccine was introduced in 1984 in the Andalusian vaccination calendar for children at 15 months of age. In year 1990, a second dose was included in the calendar for children at 11 years of age. The age of administration of the second dose was changed to six years in 1999, and to three years in 2004 [3]. These changes were made in order to adapt the levels of immunity against measles in different age cohorts to the WHO proposals regarding the elimination of indigenous measles in the European Region.

Since 2001, two important measles outbreaks have occurred in Andalusia: one in 2003 in Almeria (180 cases; unpublished data) and the other in 2008 in Algeciras (155 cases) [4]. Both outbreaks mainly affected unvaccinated young adults, although unvaccinated children under 16 months of age were subsequently also affected.

Here we present preliminary data until 15 November on an ongoing outbreak of measles in Granada, southern Spain, a city with a population of approximately 234,000 inhabitants.

## Outbreak description

On 13 October 2010, a suspected case of measles [5] in a 13-year-old girl was notified, and confirmed by serology (IgM-positive) two days later. The second case, in a 13-month-old child form the same neighbourhood was reported on 19 October 2010 by the same health centre. Both cases had attended a wedding reception where they had been in contact with a girl from another region in Spain who was diagnosed with measles when she returned home. Until 15 November 2010, a total of 25 cases of measles were confirmed (Figure 1).

The age of the cases ranged from seven months to 38 years. Nine of the 25 cases were under one year of age and 14 cases were under three years of age. Only three cases were older than 15 years.

Of the 25 cases, 21 were living in the same neighbourhood in Granada. Of these 21, 19 cases were younger than 15 years, and the other two were 24 and 29 years-old. Eight of these children were too young to attend any educational centres, while the remaining 11 were attending the following centres:

- A secondary school located outside the affected neighbourhood: one case (living in the affected neighbourhood), no secondary cases;
- Primary school A, located in the affected neighbourhood: six cases;
- Primary school B, located in the affected neighbourhood: one case, no secondary cases;

- Day care centre A, located in the affected neighbourhood: two cases;
- Day care centre B, located in the affected neighbourhood: one case, no secondary cases.

Four cases were living in other neighbourhoods in Granada or in nearby towns and were infected through transmission in hospital. These cases were 38 years, 7 months, 13 months and 16 months of age.

All cases were treated at the same hospital, 14 as outpatients, and 11 as inpatients. Two cases were diagnosed with bronchiolitis and pneumonia, respectively. Only one case, a six-year-old, had been vaccinated previously with one dose of MMR. The remaining cases were unvaccinated. Nineteen cases were laboratory-confirmed and six cases were confirmed by epidemiological link with a confirmed case. To date measles virus genotype B3 was identified in two cases. Genotyping of the other cases is ongoing.

**Figure 1**

Confirmed measles cases by day of onset of rash, Granada, Spain, October-November 2010 (n=25 as of 15 November)

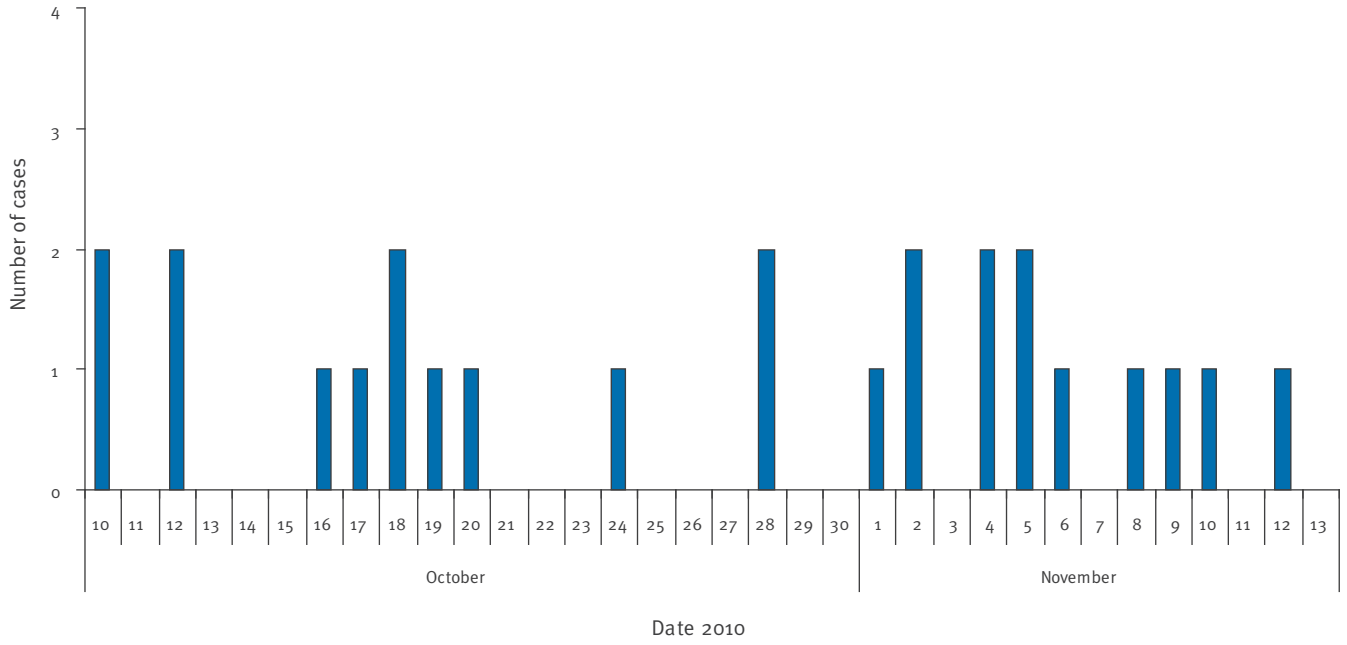
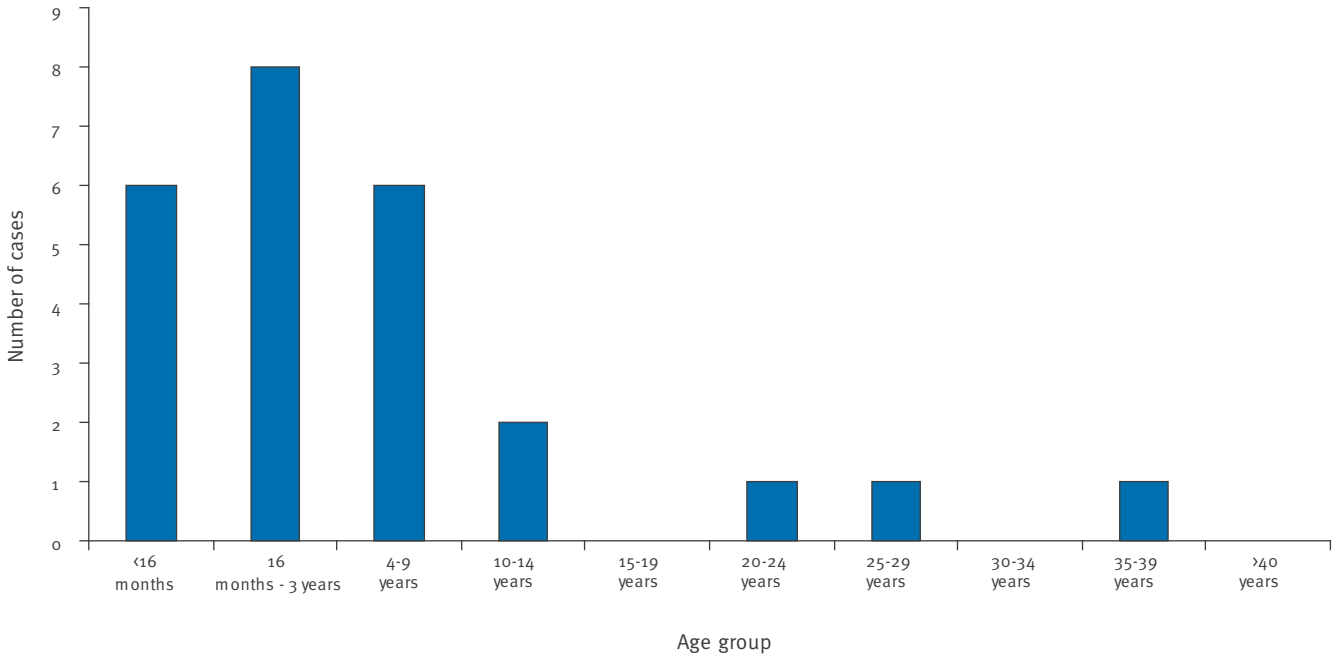



**Figure 2**

Confirmed measles cases by age, Granada, Spain, October-November 2010 (n=25, as of 15 November)



## Control measures

Control measures have been implemented in the four affected schools and the day care centre, in accordance with the Plan of Action for Measles Elimination and to Protocol of Alert of the Regional Ministry of Health [5]. The vaccination status of all children in the affected schools was reviewed and an MMR vaccine dose was offered to all children who were not fully vaccinated. Cases were excluded from school for at least four days after appearance of the exanthema. All affected school and day care staff younger than 40 years and without a history of the disease or documented evidence of vaccination were tested for susceptibility to measles and offered a dose of MMR vaccine.

In the affected day care centre, unvaccinated children aged between 12 and 15 months received one dose of MMR vaccine, and children aged between 6 and 11 months received one dose in the context of the current outbreak and are scheduled for a second dose at the age of 15 months according to the vaccination calendar. The unvaccinated contacts of cases or contacts with no history of measles were immunised with MMR vaccine in the first 72 hours after exposure, except for infants younger than six months, pregnant women and immunocompromised people, who were treated with anti-measles immunoglobulin.

It was recommended, until there are no more cases, to exclude from the affected centres individuals who were not vaccinated because of contraindications or another reason that excluded vaccination and who had no history of measles illness.

As a pre-exposure measure at the population level, a first dose of MMR vaccine is being administered to all children older than 11 months in the city of Granada and nearby towns that have reported one or more cases. A second dose of MMR vaccine will be administered to these children at three years of age according to the vaccination calendar. All health workers younger than 40 years working at healthcare centres in the outbreak area who had no history of measles or documented evidence of vaccination were vaccinated.

## Discussion

There is an ongoing measles outbreak in Granada that began in a small community in the Albaycin neighbourhood who were not vaccinated due to ideological objections. The outbreak then spread to other unvaccinated people in the neighbourhood, mainly unvaccinated children under the age of 16 month. Outside this neighbourhood, secondary cases have to date only been detected in family contacts of the first cases (four cases) or people who had contact with the first cases in hospital (four cases). In 2010, similar outbreaks have been described in other European countries [6].

In the school with the highest number of cases (primary school A) and a low MMR vaccination coverage (about 60%), the response to vaccination proposals was low at the beginning of the outbreak. We are currently working with parents of unvaccinated children in order to increase the response to vaccination, since many of these parents have no firm position against vaccination and there is a possible change of attitude. With these interventions vaccination coverage with one dose in this school has been increased to 95%.

It is important to emphasise the hospital transmission in four cases admitted to the same hospital at the beginning of the outbreak, although there has not been any case among healthcare workers so far. To avoid transmission in waiting rooms, emergency services and inpatients in health centres of Granada, training sessions for the staff were organised reinforcing the preventive aspects.

As of 7 December 2010, a total of 59 confirmed cases of measles have been reported from Granada. Most of the cases were very small children or schoolchildren under the age of 15 years (n=46). Few cases in young adults have been detected, in contrast to measles outbreaks in Algeciras (2008) [4] and Almeria (2003) (unpublished data). However, although coverage with MMR vaccine in Andalusia overall is appropriate to interrupt transmission of the disease in the population (above 95%), a seroprevalence survey done in Spain and Andalusia in 1996 in the population between two and 40 years of age shows that there are more than 5% of susceptibles in the age cohorts born between 1997 and 1986 (currently between 24 and 33 years of age) [7]. Catch-up vaccination of these age groups has not been considered until now, so it is possible that the number of cases in this age group will further increase.


### Acknowledgements

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# Ongoing outbreak of mumps affecting adolescents and young adults in Bavaria, Germany, August to October 2010

**W Otto[1], A Mankertz[2], S Santibanez[2], H Saygili[3], J Wenzel[4], W Jilg[4], W F Wieland[1], S Borgmann (Synlab@gmx.de)[3]**
1. Department of Urology, St. Josef Hospital, University of Regensburg, Regensburg, Germany
2. National Reference Centre Measles, Mumps, Rubella, Robert Koch Institute, Berlin, Germany
3. Synlab Medical Care Service, Medical Care Centre Weiden, Weiden, Germany
4. Institute of Medical Microbiology and Hygiene, University of Regensburg, Regensburg, Germany

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**Since the introduction of a two-dose MMR vaccination regime the incidence of mumps virus infections has substantially declined. However, mumps outbreaks have recently been reported from several countries. Here we report an ongoing mumps outbreak in Germany. Between 1 July and 31 October, 115 infections have been laboratory-confirmed. Reported complications include one case of meningitis and 21 cases of orchitis, suggesting a high rate of complications. We suggest a vaccination campaign for young adults in northern Bavaria to limit severe mumps infections.**

## Introduction

Mumps virus infections may have a variable clinical outcome. Most commonly they lead to fever and parotitis. However, up to 30 per cent of male adolescent mumps cases develop orchitis. The German Standing Committee on Vaccination (Ständige Impfkommission, STIKO) recommends that children be vaccinated with two doses of MMR measles-mumps-rubella (MMR) or measles-mumps-rubella-varicella (MMRV) vaccine within their first two years of life (between 11 and 14 months and between 15 and 23 months) [1]. Mumps is not a notifiable disease in Germany, therefore information about mumps cases or outbreaks is scant. In other European countries, the introduction of a two-dose MMR vaccination regime resulted in a strong decline of the number of mumps virus infections [2-4]. However, resurgent outbreaks of mumps were recently reported from several European countries [2-11], the United States (US) and Canada [12-14]. Many of the outbreaks were seen in highly vaccinated populations, calling mumps virus vaccine efficiency into question [2-4, 6-9]. Here we report on an ongoing mumps outbreak in Germany.

## Methods

The Synlab Medical Care Service Centre, Weiden, Bavaria, analyses laboratory samples from about 40 hospitals and more than 2,000 physicians serving outpatients predominantly from northern Bavaria [15]. In this study, results of serological mumps tests were evaluated. Data collected between January 2009 and October 2010 were examined. In total 1,248 serum samples were examined for IgM antibodies and 4,824 samples for IgG antibodies. More than 99% of these samples were derived from Bavarian patients.

Mumps antibody testing of patient sera was performed by using Enzygnost ELISA (anti-parotitis-virus/IgM and anti-parotitis-virus/IgG, Siemens Healthcare Diagnostics Products, Marburg, Germany). Results of IgM ELISA were given as negative, borderline (equivocal), and positive. Results of IgG ELISA were given as negative (‹230 U/ml), borderline (equivocal) (230 – 500 U/ml), and positive (›500 U/ml). In the present analysis acute mumps infection was assumed when patients were IgM antibody positive or when patients either showed a borderline IgM antibody test result in combination with typical symptoms or had detectable mumps virus ribonucleic acid (RNA).

The German Reference Centre for measles, mumps and rubella virus at the Robert Koch Institut performed PCR analyses from either throat swabs and/or urine samples. The primers MuNP1 (5‘- AGTGTACTAATCCAGGCTTG -3‘) and C (5‘- ACCCACCATTGCATAGTATC -3‘) were used to carry out complimentary deoxyribonucleic acid (cDNA) synthesis (50°C, 30 min; 95°C, 15 min) and the subsequent first round of a nested PCR at 30x (94°C, 30 sec; 52°C, 30 sec, 72°C, 1 min) plus 10 min 72°C. MuNP3 (5‘- GTATGACAGCGTACGACCAAC -3‘) and MuNP4 5‘- GATAGCAACCCCTGCCGTCT -3‘ for the second round 95°C, 5 min, 30 x (94°C, 30 sec; 52°C, 30 sec, 72°C, 1 min). Genotyping of detected mumps virus was performed as recommended in the Proposal for genetic characterisation of wild-type mumps strains [16].

Clinical data from mumps patients with orchitis were recorded at the Department of Urology at the St. Josef Medical Centre in Regensburg. The department of urology is a facility of the University of Regensburg.

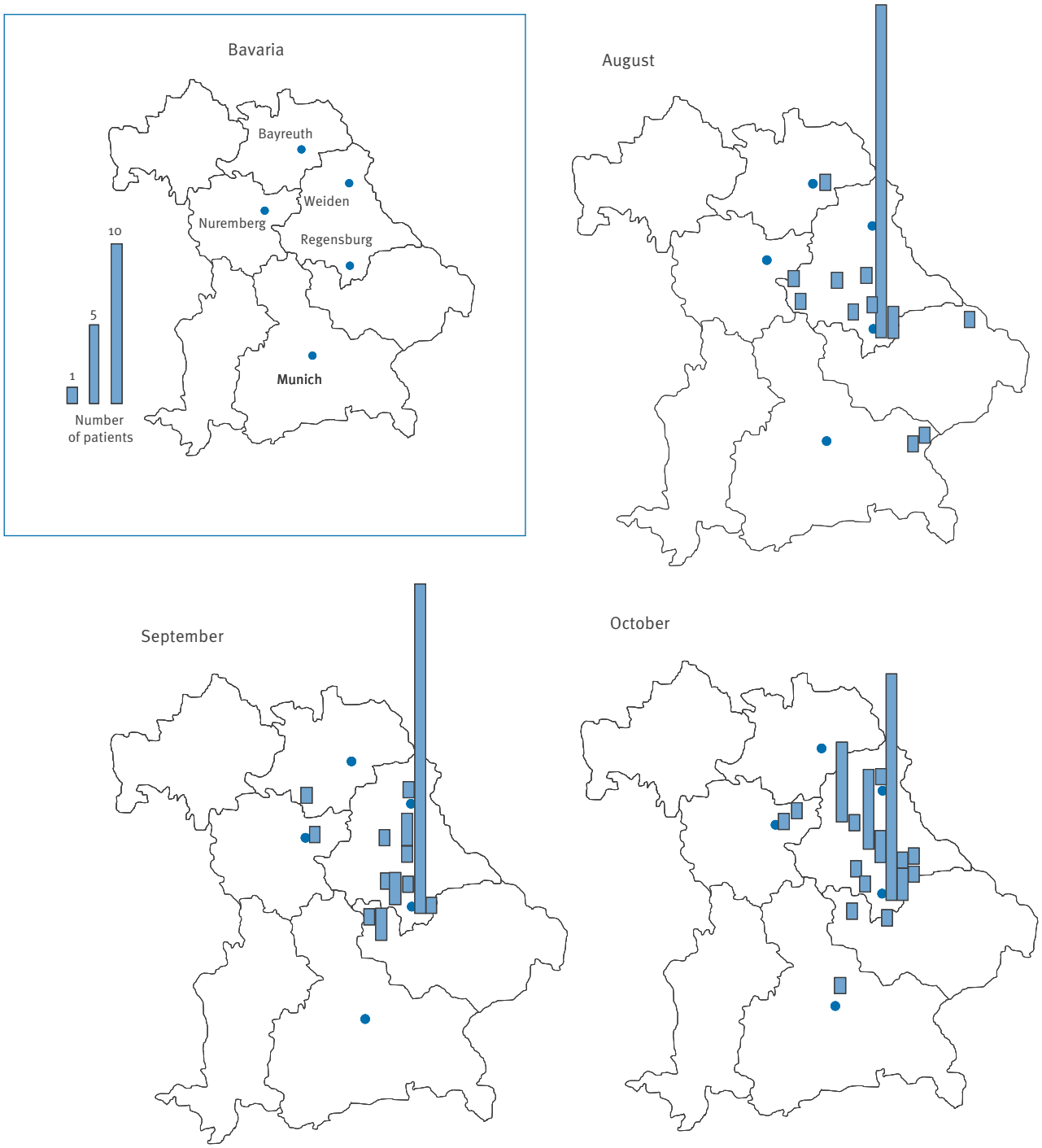
## Results

In the pre-outbreak period from January 2009 to June 2010 the number of patients infected with mumps virus was low (median per month N = 1 (range 0 – 3)). However, this number has dramatically increased since the outbreak started. In July 2010 six patients tested positive for mumps IgM antibodies. In August 18 patients tested positive, in September 22 patients and in October 32 patients, respectively. Additionally, in August 2010 eleven patients exhibiting mumps infection symptoms had borderline IgM test results. In September this number was eight and in October the number was 13.

Furthermore, positive PCR results were obtained from seven patients. Only two of the patients showed IgM antibodies while all PCR-positive patients exhibited IgG antibodies (median 14,000 U/ml). Genetic characterisation of mumps virus detected in the clinical material of seven cases revealed presence of genotype G.

### Figure

Regional localisation of mumps virus infections in Bavaria, Germany, August-October 2010[a]




[a] The map shows the boundaries of the German federal state of Bavaria and boundaries of the Bavarian districts. Most cases were observed in Regensburg (southern Oberpfalz). Number of mumps cases per location is represented by the peaks of blue bars.

In total 115 mumps infections were confirmed positive at the Weiden Synlab laboratory and at the Robert Koch Institute between 1 July and 31 October 2010. The median age was 24.5 years (mean 26.8 years, range 14–62 years). However, information on the vaccination status was available from only seven mumps patients. One of them was unvaccinated, one patient had received one dose of MMR and five patients had been vaccinated twice.

As illustrated in the Figure the majority of the infections occurred in the city of Regensburg (about 135,000 inhabitants) or in the surrounding area. This finding was most prominent in August while in September and October an increasing number of cases were noted in the region located northwest of Regensburg.

In August, one patient was diagnosed with mumps meningitis and a second case was suspected in November. In total 21 patients were treated at the St. Josef Hospital in Regensburg (median age 26 years) between July and October 2010, resulting in a total of 76 days of hospitalisation (Table).

## Discussion

We give a preliminary description of an ongoing outbreak of mumps virus infection in northern Bavaria. Similarly to previous outbreaks in Austria, Luxembourg, Ireland and the Netherlands, the present outbreak affects mainly young adult patients [4, 5, 9,11].

We suppose that the actual number of affected patients is by far higher than 115 cases since certainly not every clinical case was confirmed in our laboratory.

Furthermore, the present case definition in Germany uses positive IgM antibody and/or positive PCR results [17]. Many patients with clinical symptoms displayed high IgG antibody titres probably due to prior immunisation or infection. As known from other viral diseases a viral re-infection is not necessarily accompanied by a rise in IgM antibodies but rather by an increase of IgG antibodies. Accordingly, during the outbreak months of July, August, September and October 2010, the median IgG titres were markedly higher than those observed in the previous months (January 2009–June 2010; data not shown). This supports the hypothesis that many mumps (re-)infections were accompanied by an increase of IgG antibody titre and not by the formation of IgM antibodies. This may have resulted in an underestimation in the number of mumps cases. Absence of mumps virus-specific IgM antibodies in the majority of the clinical cases, as determined in the current outbreak in Germany, is concordant with the laboratory data reported by the Centers for Disease Control and Prevention from an outbreak observed in a highly vaccinated population in the US [12].

**Table**

Clinical features of patients suffering from mumps orchitis, University Hospital of Regensburg, Germany July – October 2010

| Date of diagnosis | Age (years) | Mumps-IgG [U/ml] | Mumps-IgM | Symptoms | Hospital stay [days] |
|---|---|---|---|---|---|
| 16.07.2010 | 22 | N.d. | N.d. | Fever[a], testical swelling | 6 |
| 22.07.2010 | 27 | 9,000 | Positive | Subfebrility[b], testical swelling, otitis | 9 |
| 30.07.2010 | 24 | N.d. | N.d. | Buccal and testical swelling | 0 |
| 01.08.2010 | 25 | 22,000 | Borderline | Subfebrility, buccal, cervical and testical swelling | 5 |
| 08.08.2010 | 26 | 670 | Borderline | Subfebrility, testical swelling | 4 |
| 15.08.2010 | 22 | 24,000 | N.d. | Subfebrility, buccal and testical swelling | 8 |
| 18.08.2010 | 22 | 15,000 | Positive | Fever, testical and epididymical swelling | 6 |
| 17.08.2010 | 18 | N.d. | N.d. | Fever, testical swelling | 4 |
| 23.08.2010 | 37 | N.d. | N.d. | Fever, buccal, testical and epididymical swelling | 8 |
| 26.08.2010 | 33 | N.d. | N.d. | Buccal and testical swelling | 6 |
| 06.09.2010 | 18 | N.d. | N.d. | Fever, testical swelling | 4 |
| 06.09.2010 | 29 | 3,800 | Positive | Subfebrility, testical swelling | 6 |
| 06.09.2010 | 44 | 8,000 | Negative | Testical swelling | 0 |
| 16.09.2010 | 48 | N.d. | N.d. | Fever, buccal, testical and epididymical swelling | 6 |
| 22.09.2010 | 27 | 2,200 | Positive | Buccal and testical swelling | 0 |
| 26.09.2010 | 24 | 15,000 | Positive | Fever, buccal, testical and epididymical swelling | 4 |
| 23.09.2010 | 20 | 980 | Positive | Buccal, testical and epididymical swelling | 0 |
| 26.09.2010 | 26 | N.d. | N.d. | Subfebrility, buccal and testical swelling | 0 |
| 27.09.2010 | 30 | N.d. | N.d. | Testical swelling | 0 |
| 03.10.2010 | 19 | 4,200 | Positive | Subfebrility, buccal, testical swelling | 0 |
| 07.10.2010 | 30 | N.d. | N.d. | Buccal, testical and epididymical swelling | 0 |

N.d.: Not determined.

[a] Body temperature › 38.5°C.

[b] Body temperature 37.5°C – 38.5°C.

In contrast to Germany, mumps is a notifiable disease in Ireland and the Netherlands, where the collection of epidemiological data from many patients has been possible. In these populations the majority of the patients had been vaccinated and at least in the Dutch group most patients had been vaccinated twice [9]. Although we could get only limited information about vaccination status our data support the finding that most patients had been vaccinated completely indicating that complete vaccination does not prevent mumps infection in an outbreak situation with absolute certainty.

The current outbreak in Bavaria was caused by mumps virus genotype G. Previous analyses have revealed that this genotype was associated with several mumps outbreaks in Europe and the US [2,5,18,19]. The possible emergence of a mutant strain of mumps virus has been reported under the selective pressure of immunisation with limited or no cross-protection induced by the vaccine strain [20]. A recent analysis indicated that individuals possessing low levels of neutralising antibodies may be at risk for breakthrough infections [21]. These findings underline the importance of investigating whether the current situation in Germany is due to a high degree of susceptible individuals or to a breakthrough of a currently circulating wildtype mumps virus.
In the present outbreak, predominantly young male patients have been affected. Complications as mumps orchitis have resulted in the hospitalisation of at least 13 young adult males.

The outbreak started in the city of Regensburg (about 135,000 inhabitants) and its surrounding area. In September and October an increasing number of cases was noted in the region located northwest of Regensburg. Due to very recent observations this trend also continued in November (data not shown) and it seems probable that the outbreak will soon reach the city of Nuremberg (about 500,000 inhabitants) and surroundings with 1.2 million inhabitants.

Measures taken by public health service in Luxembourg were recently proven to help confining a mumps outbreak among the military staff [5]. Furthermore a mass-vaccination successfully stopped a mumps outbreak in Austria [11]. Therefore it appears highly beneficial to initiate a vaccination campaign in northern Bavaria.

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# First identified case of VIM-producing carbapenem-resistant Klebsiella pneumoniae in the Republic of Ireland associated with fatal outcome

**A R Prior (annarosep@yahoo.com)[1], C Roche[2], M Lynch[1], S Kelly[1], K O'Rourke[3], B Crowley[2]**
1. Department of Clinical Microbiology, Mater Hospital, Dublin, Ireland
2. Department of Microbiology, St James's Hospital, Dublin, Ireland
3. Department of Neurology, Mater Hospital, Dublin, Ireland

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**To the editor:** Following the recent review of carbapenem-resistant *Enterobacteriaceae* (CRE) in Europe [1], we would like to add that a first case of VIM-1 producing carbapenem-resistant *Klebsiella pneumoniae* has now also occurred in Ireland, associated with the repatriation of a patient from a Greek hospital.

In September 2010 a woman in her mid-fifties, was transferred from a Greek hospital to the intensive care unit of our institution, with severe herpes simplex encephalitis. She was empirically treated with vancomycin and meropenem for nosocomial pneumonia. *Pseudomonas aeruginosa* and *Enterobacter cloacae* cultured from respiratory specimens were susceptible to meropenem. However, *K. pneumoniae* resistant to meropenem was identified from a swab collected from a deep sacral pressure sore. The patient was immediately isolated. Treatment with tigecycline and intravenous colistin was added, but the patient died within seven days of her transfer. No isolates of CRE were detected in samples collected from patient's contacts.

The patient's isolate was found to be resistant to all beta-lactam antibiotics, including the carbapenems, as well as all aminoglycosides and fluoroquinolones, but remained susceptible to colistin and had intermediate susceptibility to tigecycline (2 mg/L) according to EUCAST criteria [2]. Carbapenemase production was indicated by a positive modified Hodge plate test. Phenotypic screening for *K. pneumoniae* carbapenemase production was negative, but positive for production of a metallo-beta-lactamase. The presence of the gene encoding VIM-1 was confirmed by sequence analysis (GenBank accession number HQ442296).

This first VIM-1-producing *K. pneumoniae* isolate in Ireland belonged to the group of enterobacteria producing the recently reported New Delhi metallo-beta-lactamase NDM-1. To date, there is only one report of endemic class A KPC-2 production in *K. pneumoniae* in Ireland [3].

The case highlights the importance of prompt implementation of infection control measures in patients repatriated from countries where CREs are endemic. Such patients should be placed in isolation using contact precautions until results of surveillance cultures are available [4].

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# Start of the influenza season 2010-11 in Europe dominated by 2009 pandemic influenza A(H1N1) virus

**Influenza Team (influenza@ecdc.europa.eu)**[1]
1. European Centre for Disease Prevention and Control (ECDC), Stockholm, Sweden

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The influenza season 2010-11 in Europe has started with increasing transmission in 11 countries [1]. The currently circulating strains are predominantly the 2009 pandemic influenza A(H1N1) and influenza B viruses [1], strains that are included in the current trivalent seasonal influenza vaccine. The United Kingdom (UK), so far the most affected country, has seen a number of outbreaks. Although the majority of cases in the UK are mild, a significant number of severe hospitalised cases and several deaths have occurred, some in patients belonging to risk groups, including pregnant women [2]. This has resulted in an increased demand of intensive care treatment and respiratory support including extracorporeal membrane oxygenation (ECMO). Most patients are under 65 years of age.

In the past epidemics have most often progressed from west to east in Europe [3]. There is a rapidly closing window of time during which public health and clinical interventions can mitigate the impact of this season's influenza epidemics on morbidity and mortality. Countries should be prepared for increased demand for healthcare assistance and promote early sample collection and testing for patients with influenza-like-illness.

Influenza vaccination with the 2010 trivalent seasonal influenza vaccine is the most effective prevention measure and is recommended in particular for those at risk of developing severe disease [4]. There is strong evidence suggesting that the A(H1N1) component of the seasonal vaccine will be highly effective against influenza-like illness caused by the pandemic influenza A(H1N1) virus. Good protection was achieved as early as eight days after vaccination [5].

Early use of antiviral drugs for individuals belonging to risk groups will also be of value. The currently circulating variant can be expected to be sensitive to oseltamivir and zanamivir, as the old oseltamivir-resistant influenza A(H1N1) virus has been displaced by the pandemic strain and very few viruses so far have been reported as being resistant [6]. However, isolates should be monitored for the emergence of antiviral resistance, particularly in immunocompromised patients.

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