

Outbreak report

# A measles outbreak in children under 15 months of age in La Rioja, Spain, 2005-2006

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**This paper describes a measles outbreak in La Rioja, Spain, which began in December 2005 and mainly affected children under 15 months of age who were not yet immunised with MMR vaccine. The measles cases were detected by the mandatory reporting system, under which laboratories must report every confirmed measles case. Cases were classified in accordance with the National Measles Elimination Plan: suspected and laboratory-confirmed. In the period 14 December 2005 to 19 February 2006, 29 suspected cases of measles were investigated, and 18 were confirmed. The mean incubation period was 13.8 days (range: 9 to 18). Of the 18 confirmed cases, only two were in adults. MMR vaccination was recommended for all household contacts, as well as for the children aged 6 to 14 months who attended the daycare centres where the cases had appeared. At these centres, the second dose of MMR was administered ahead of schedule for children under three years of age. It was recommended that the first dose of MMR vaccine be administered ahead of schedule for all children aged 9 to 14 months. During an outbreak of measles, children aged 6 months or older, who have not previously been vaccinated against measles, mumps and rubella, should receive a first dose as soon as possible, and those who have had a first dose should receive a second dose as soon as possible, provided that a minimum of one month has elapsed between the two doses.**

**Introduction**

The Autonomous Community of La Rioja is situated in northern Spain and has a population of 301084. To comply with the World Health Organization (WHO) objectives, Spain has adopted a policy of interruption of indigenous measles transmission since 2000 [1]. The Strategic Plan for Measles and Congenital Rubella Infection in the European Region of WHO identifies key strategies to meet the targets for the European Region of interrupting indigenous measles transmission by 2010 [2]. Measles vaccination began in La Rioja in 1977 [3] and was replaced by combined measles, mumps and rubella (MMR) vaccine in 1984. In 1990, a second dose of MMR vaccine was introduced at the age of 10-11 years for both boys and girls. Since then, the number of cases has declined markedly, although there was a measles outbreak in La Rioja in 1992 which affected children and young adults aged 12 to 20 years, with an attack rate of 22.2 per 1000 population [4].

The most recent measles case to be reported in La Rioja occurred in 1999 [5]. In Spain, the incidence in 2004 was 0.06 cases per 100 000 population [6]. Measles is no longer an endemic disease in La Rioja, yet it is evident that there is a risk of the appearance of cases of disease linked to imported cases, as has been described in other areas [7].

In La Rioja the first dose of measles, mumps, and rubella vaccination is given to children at age 15 months and the second at 3 years of age. In 2005, childhood vaccine coverage against measles in La Rioja was estimated to be 96.3% at 15 months of age [8]. Children below this age are particularly at risk for measles after the disappearance of maternal measles antibodies [9]. Young adults who have not had a measles infection and have not been vaccinated are also at risk [10].

This paper describes a measles outbreak in La Rioja, which began in December 2005 and mainly affected children under 15 months of age and therefore not yet immunised with MMR vaccine.

**Methods**

The measles cases were detected by the mandatory reporting system. According to this system, physicians must report every suspected measles case, and laboratories must report every confirmed measles case.

Cases were classified as per the National Measles Elimination Plan, as follows [1,11]:

- Suspected case, that is, any case with maculopapular rash, high fever and one or more of the following symptoms: cough, coryza or conjunctivitis;
- Laboratory-confirmed case, that is., any case with virological diagnosis of the infection, with the diagnostic criterion of choice being indirect detection through presence of serum IgM-specific antibodies and/or detection of measles virus genome by RT-PCR; and,
- Confirmed case with epidemiological link, that is, any suspected case that could not be studied by a laboratory for serological confirmation and that had been in contact with a serologically-confirmed case of measles in which onset of rash took place 7-18 days before the current case.

Serodiagnosis of measles was based on detection by IgM-specific indirect enzyme-linked immunosorbent assay (ELISA) (Enzygnost, Dade Behring, Germany). The polymerase chain reaction (PCR) technique, performed on two different aliquots of specimen of urine, serum and/or nasopharyngeal exudate, also contributed to diagnosis [12]. For genotyping purposes, a different PCR test, designed to detect the variable fragment of the C terminal domain of the measles virus nucleoprotein (456 pb), was used on the specimens above, followed by the sequencing of the fragment and phylogenetic analysis. 13 A positive result with the two different PCR techniques [12,13] confirmed cases in which there was no specimen for serological study.

We consider that an outbreak is over when there has been at least 21 days without any new cases [14].

**Results**

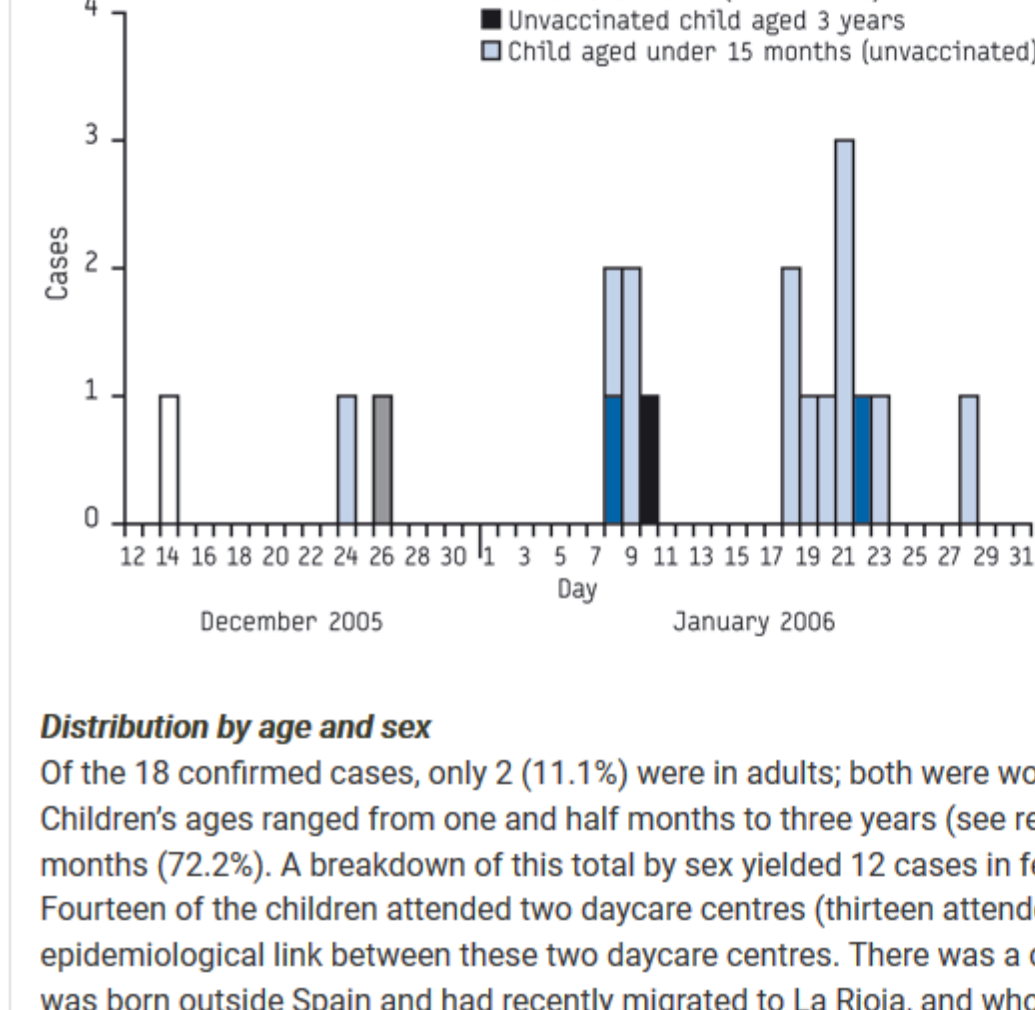
On 10 January 2006, a paediatrician reported suspected measles in two children aged 9 and 14 months. The index case was identified as a 32 year old female physician who had been working during the period of disease transmissibility and had seen these two children for consultation on 26 December 2005. On 14 December 2005, this physician had been present by chance at a health centre at the same time as a 28 year old woman who presented with rash that same day. The 28 year old woman is considered to be the primary case in the outbreak.

In the period from 14 December 2005 to 19 February 2006, 29 suspected cases of measles were investigated. Of these, 18 were confirmed (62.1%), 17 by laboratory and one by epidemiological link. The latter case involved a child, aged 18 month, who was the son of the primary case. This child was the second case. All suspected but unconfirmed cases were excluded from analysis. All the cases lived in Logroño, the capital city of La Rioja.

The last case to be documented presented with rash on 28 January 2006, and the outbreak came to an end 21 days later on 19 February. Three clinically compatible cases without any epidemiological link were reported after this date, but were subsequently ruled out by the laboratory. The mean incubation period was 13.8 days (range: 9-8 days). The epidemic curve of the confirmed cases is shown in the figure. Two incidence peaks can be seen: the first corresponds to secondary cases related with the cases that took place in December 2005, and the second to secondary cases related with the cases that occurred in January 2006.

**FIGURE**

**Epidemic curve for laboratory confirmed cases from date of onset of rash. La Rioja, Spain, December 2005 to January 2006**



**Distribution by age and sex**

Of the 18 confirmed cases, only 2 (11.1%) were in adults; both were women (see results) aged 28 and 32 years. Children's ages ranged from one and half months to three years (see results), with thirteen children aged under 15 months (72.2%). A breakdown of this total by sex yielded 12 cases in females (66.7%) and 6 in males (33.7%) [TABLE]. Fourteen of the children attended two daycare centres (thirteen attended the same one). We do not know the epidemiological link between these two daycare centres. There was a case in an unvaccinated three year old child who was born outside Spain and had recently migrated to La Rioja, and whose vaccination status had not yet been updated.

**TABLE**

**Age and sex distribution of patients with laboratory-confirmed cases of measles. La Rioja, Spain, December 2005 to January 2006**

Age	Sex		Laboratory results	
	Male	Female	PCR +	IgM
0-6 months	0	1	0	1
7-15 months	5	7	12	8
16 months-3 years	1	2	2	3
4 years-24 years	0	0	0	0
> 24 years	0	2	1	2
All	6	12	15	14

PCR: Polymerase chain reaction

**Clinical characteristics**

All cases presented with maculopapular rash and high fever. The remaining symptoms were: cough, 16 cases (88.9%); coryza, 15 cases (83%); conjunctivitis, 12 cases (66.7%). Six cases (33.3%) presented with adenopathies.

Complications were as follows: earache, three cases (16.7%); bronchitis, three cases (16.7%); laryngitis, one case (5.6%); and laryngotracheitis, one case (5.6%). No case required hospital admission. There were no deaths.

**Laboratory results**

Fourteen confirmed cases presented with anti-measles IgM antibodies (77.8%). In 14 of the confirmed cases (77.8 %) genotype D6 virus was identified by PCR. One case (5.6%) could not be genotyped. In three cases, PCR proved negative in serum, urine and pharyngeal exudate and IgM was positive and considered as laboratory confirmed.

**Measures adopted**

MMR vaccination was recommended for all family contacts, and for children aged 6 to 14 months who attended the two daycare centres where there had been cases. At these centres, the second dose of MMR was administered ahead of schedule to children under three years of age. Work colleagues who were previously unvaccinated were also vaccinated in one case (only unvaccinated). It was recommended that the first dose of MMR vaccine be administered ahead of schedule for all children aged 9 to 14 months in La Rioja.

**Discussion**

In the post-vaccination era, incidence of measles cases is very low in western countries with very high vaccination coverage. Outbreaks occur with a certain frequency, generally among adolescents or young adults who have neither been vaccinated nor exposed to the circulating virus [15,16]. In Spain, this group coincides with the 1975-1982 birth cohort [17]. Cases are seen less frequently in children and infants than in older children, though outbreaks have been reported in children who have not yet been vaccinated [18,20]. In a recent outbreak in London, 40% of subjects affected were infants under 12 months of age [21]. In Spain, 9% of measles cases reported in 1997 involved children aged under 1 year, and over 50% were in ages ranging from 10 to 19 years [22].

Recently, there have been reports of outbreaks in infants [21,23,24]. In Spain, children aged under 15 months, that is, those who have not yet been vaccinated against measles, constitute an important risk group. The risk is higher in non-vaccinated children aged 6 months old or older [25], because from the age of 7 months onwards, 65% of children no longer have titres of protective maternal antibodies [26]. Children aged under 15 months are currently at greater risk of measles infection than children and adolescent, and at greater risk of serious sequelae.

This outbreak underscores the need for an epidemiological surveillance system which enables rapid detection of virus circulation in the population, early identification of outbreaks and immediate adoption of control measures, since vaccination is not routinely recommended in children under the age of 12 months [27].

These results support the recommendation that, during an outbreak of measles, children aged 6 months or older who have not been vaccinated against measles, mumps and rubella should receive a first dose of MMR vaccine as soon as possible, and that those who have already had a first dose should receive a second dose as soon as possible, provided that a minimum of one month has elapsed since the first dose [28]. Children of vaccinated mothers lose measles antibodies quicker than children of mothers who have been naturally infected with measles [29].

In this outbreak, there were no cases in children who had been vaccinated with two doses of MMR, and this highlights the need to maintain two-dose vaccination coverage above 95%, since this interrupts viral circulation [30] in the population. In La Rioja, these coverages have been maintained since 1995 [31].

D6 genotype identification coincides with a genotype that circulated in Spain in the period 1993-1997 but has not been identified in Spain since [13]. The D6 measles virus identified was genetically identical to the outbreak strain circulating in the Ukraine at this time [32].

The appearance of outbreaks and the evidence of measles virus circulation in countries or regions that have previously been virus-free have led the WHO Regional Office for Europe to postpone the goal of eradicating measles by the year 2010 [6].

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