



[← Back to Table of Contents](#)

[en](#) [es](#) [fr](#) [it](#) [pt](#)

[← Previous](#)

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INTERRUPTION OF MEASLES TRANSMISSION IN GIPUZKOA (BASQUE COUNTRY), SPAIN

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G Cilla¹, M Basterretxea², J Artieda², D Vicente¹, E Pérez-Trallero^{1,3}

1 Servicio de Microbiología, Hospital Donostia, Spain

2 Unidad de Epidemiología, Dirección Territorial de Sanidad de Gipuzkoa, Spain

3 Departamento de Medicina Preventiva y Salud Pública, Facultad de Medicina, Universidad del País Vasco, San Sebastián, Spain.

Measles vaccine was introduced in Gipuzkoa (Basque country, Spain) in 1978 and was replaced by the measles, mumps, and rubella (MMR) vaccine for children aged 12-15 months in 1981. A second dose of the MMR vaccine was introduced in 1992. Both doses of the MMR vaccine were well accepted by the population and high coverage was achieved (95% and 91% for the first and second doses respectively for the period 1993-2002). Measles virus circulation was interrupted in the second half of the 1990s: no cases of indigenous measles were notified between 1998 and 2003, and only imported cases have been confirmed during this period. These data indicate that the measles vaccination programme implemented has been effective. Nevertheless, to avoid measles outbreaks following viral introduction, high MMR vaccine coverage levels for the two doses have to be maintained (>95%).

Introduction

The World Health Organization (WHO) has made the interruption of indigenous measles transmission by 2010 a target for its European Region [1]. However, the epidemiology of this infection in European countries currently shows considerable differences, mainly due to different immunisation strategies and targets, their time of implementation, their degree of acceptance in the population, and therefore the levels of immunisation coverage achieved [2]. In Spain, measles vaccination (Schwartz strain) was included in the vaccination calendar in 1978, producing a marked decrease of the incidence of measles infection. The present study describes changing patterns of measles in Gipuzkoa since 1984, a region in which no indigenous cases of measles have been notified for the past 6 years (1998-2003).

Methods

Gipuzkoa is one of the three regions of the Basque Autonomous Community (northern Spain), with 676 208 inhabitants. Measles vaccination of children aged 9 months was introduced in 1978 and was replaced by the measles, mumps, and rubella (MMR) vaccine in children aged 12-15 months in 1981. In the Basque Autonomous Community, a second dose of this vaccine was introduced for children aged 11 years in the 1991-92 academic year. In 2000, the age of administration of the second dose was brought forward to 4 years and a vaccination catch-up campaign was carried out for children aged 5-11 years.

The vaccine coverage achieved was calculated by considering the number of children and adolescents vaccinated in the public health services, where each vaccination is documented, and the total number of subjects to undergo vaccination, obtained from the corresponding population census (Euskal Estatistika Erakundea (Basque Statistics Office)). We did not consider the doses of the MMR vaccine delivered through the private sector, as these represent <1% of all doses administered in the region. The annual incidence of measles was obtained from the mandatory notification system (weekly notifications of suspected cases of measles by paediatricians and general practitioners). The

definition of a suspected case of measles was: generalised rash lasting longer than 3 days, fever higher than 38.3°C and cough, coryza or conjunctivitis. We considered as confirmed cases those which had a positive IgM against measles (laboratory confirmed cases) and those suspected cases epidemiologically linked to a laboratory confirmed case.

Since 1986, serological investigation of measles cases in Gipuzkoa has been performed by the microbiology laboratory of the Hospital Donostia in San Sebastián. IgM against measles was requested to confirm suspected cases of measles and also for other patients for whom a physician considered it convenient to exclude a measles virus infection, that is, encephalitis, other exanthematous diseases, etc. Detection of IgM antibodies to measles was performed with an enzyme-linked immunosorbent assay (Dade Behring, Germany) on previously treated sera to eliminate rheumatoid factors.

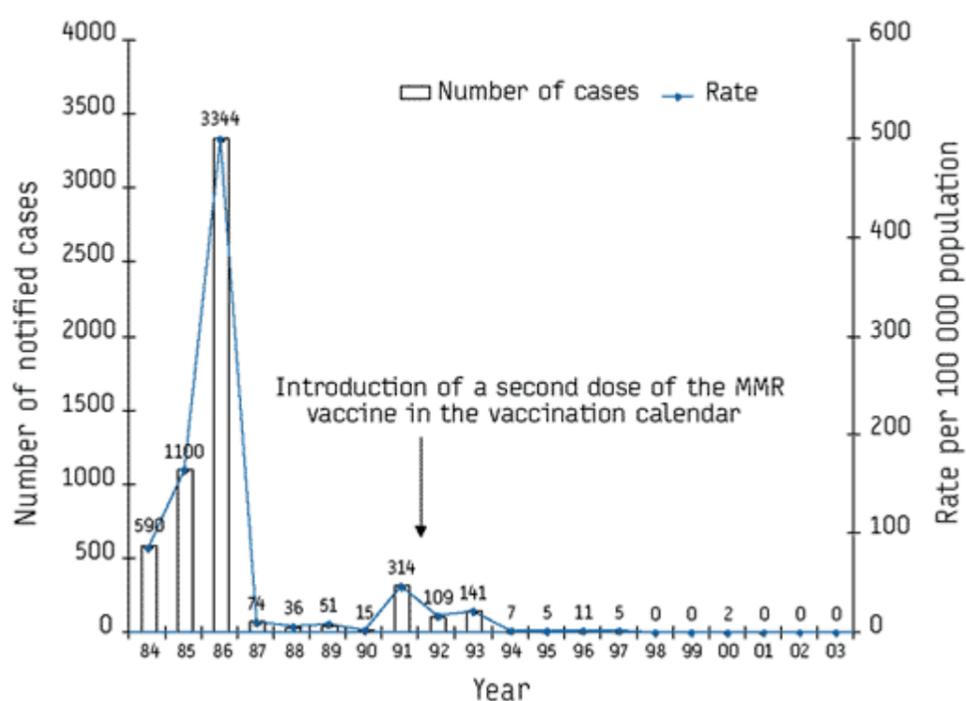
Results

The first dose of the MMR vaccine presented a vaccine coverage of >90% from 1987, with the exception of 1992 (87%); the mean annual coverage was 95.1% for 1993-2002. The vaccine coverage of the second dose of the MMR vaccine was >88% from 1993, with the exception of 2000, when it was 83.4%, rising to 93.0% in 2002 (a mean annual coverage of 90.6% for 1993-2002). The coverage obtained in the vaccination catch-up campaign was 92.4%. About 98% of children received the first dose of the MMR vaccine in their second year of life showing a good compliance with the immunisation schedule.

The number of notified measles cases decreased considerably after an epidemic with an incidence of 480.1 cases per 100 000 inhabitants in 1986 [FIGURE]. Incidence rates oscillated between 10.2 and 2.2 cases per 100 000 inhabitants between 1987 and 1990. Between 1991 and 1993 measles outbreaks occurred in several regions of Gipuzkoa (an incidence of 45.6 cases per 100 000 inhabitants in 1991). Since 1994, the number of notified cases has been very low: two cases were notified in the period 1998-2003, both of which occurred in 2000. The first case was a 31 year old man from Gipuzkoa who had spent the incubation period in London (laboratory confirmed case) and the second case was the result of transmission from this man to his sister (epidemiologically confirmed case). Neither of these two individuals had been vaccinated. A third imported case was detected in 2000 and serologically confirmed. This case was not notified because it occurred in a 12 year old Irish boy who was in Spain temporarily.

FIGURE

Number of notified cases of measles and incidence rates per 100 000. Gipuzkoa, Spain, 1984-2003



Source: weekly notifications by paediatricians and general practitioners

Since 1987, samples from 1218 patients were processed for serological investigation of measles, detecting specific IgM in 174 patients [TABLE]. The proportion of cases aged more than 10 years rose from 4.3% for the 1986-1989 period (1/23 cases of known age) to 45.7% for the 1990-1993 period (48/105 of known age).

TABLE

Number of cases in which detection of IgM against measles

NUMBER OF CASES IN WHICH DETECTION OF IgM AGAINST MEASLES was requested in Gipuzkoa and number of IgM positive cases between 1986 and 2003

Period	1986-89	1990-93	1994-97	1998-2003
Investigated cases	60	430	366	362
IgM Positive (%)	27 (45.0)	139 (32.3)	6 (1.6)	2* (0.6)

* Cases imported from the United Kingdom and Ireland respectively (see Results section).

Discussion

Both epidemiological (notifications) and microbiological data (serologically confirmed cases) indicate that measles virus circulation was interrupted in Gipuzkoa in the second half of the 1990s; no cases of autochthonous measles have been notified in the past six years, and only imported cases were confirmed during this period. These data indicate that the measles vaccination programme implemented has been effective. The introduction of a single dose MMR vaccine was well accepted by the population and high vaccine coverage was achieved from 1987. This, and the fact that measles was highly endemic in the years immediately before implementation of the programme, produced a considerable reduction in the incidence of the disease, which was below 11 cases per 100 000 inhabitants between 1987 and 1990. However, important outbreaks of measles in 1991 prompted the decision that same year to introduce a second dose to interrupt measles virus circulation. In 1995 and 1997 the incidence was already lower than 1 case per 100 000 inhabitants, and the important outbreak of rubella in Gipuzkoa in 1996 [3] was probably the cause of the slight increase in measles notifications observed that year. In countries approaching the interruption of indigenous measles transmission, cases of rubella are not infrequently mistaken for measles [1]. A few years after the introduction of the second dose, which also achieved high coverage, circulation of indigenous measles virus was interrupted and no autochthonous cases were notified in 1998-2003. Despite of these favourable results, the administration of the second dose of the MMR vaccine must be strengthened to achieve the very high levels of coverage recommended by the WHO in each of the two doses (>95%), and to avoid the accumulation of susceptible people and the threat of future outbreaks [1].

The changes produced in Gipuzkoa are probably representative of the progress toward measles control obtained in Spain in the last two decades. In Spain, each autonomous community has the power to decide its vaccination policy. Overall, the trend in Spain is towards a reduction: the incidence of measles since 1999 has been <1 case per 100 000 inhabitants and in 2002 only 64 cases were confirmed by laboratory analysis or epidemiological link [4]. In Catalonia, interruption of indigenous measles transmission was confirmed between June 1999 and July 2000 [5]. Indeed, the prevalence of immunity to measles in the Spanish population in 1996 was encouraging, with the percentage of immune individuals in almost all age groups above the levels recommended by the WHO for interruption of viral transmission; only the 1977-81 cohort, composed of individuals born prior to or at the time when vaccination was being introduced, failed to reach these levels [6]. Nevertheless, measles outbreaks still occur in Spain [4], indicating that there are still groups within the Spanish population whose level of immunity allows viral circulation.

Decreases in vaccine coverage have also been observed throughout these years in Gipuzkoa, when changes in the vaccination strategy were implemented (1992 and 2000). Measles is one of the most infectious diseases known to man, and consequently decreases in vaccine coverage should be detected and corrected as soon as possible. Reintroductions are frequent in Spain [4,5], a finding confirmed in the present study. It is therefore essential that surveillance systems be kept active and that all physicians suspecting a case of measles contact the relevant health authorities as soon as possible for laboratory confirmation [1].

The results obtained in the present study confirm that the two dose MMR vaccine strategy introduced in our region has been effective. This strategy, which has achieved high coverage, can interrupt indigenous viral circulation within a few years. Nevertheless, given that measles virus is highly contagious and continues to be endemic in many regions throughout the world, it is essential to maintain high vaccine coverage in the two doses of the MMR vaccine (>95%) so that the percentage of susceptible individuals in the population remains very low.

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[◀ Back to Table of Contents](#)

[en](#) [es](#) [fr](#) [it](#) [pt](#)

[◀ Previous](#)

[↑ To top](#) | [▶ Recommend this page](#)

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