

An outbreak of mumps in the Province of León Spain 1995-1996

Like 0

This item has no PDF Download

L. E. Visser², K. C. González Perez¹, J. Ramos Tejera³, A. C. Berjón Barrientos³, Y. Vergara Guerrero³, J. F. Martínez Navarro¹

Hide Affiliations

Affiliations:

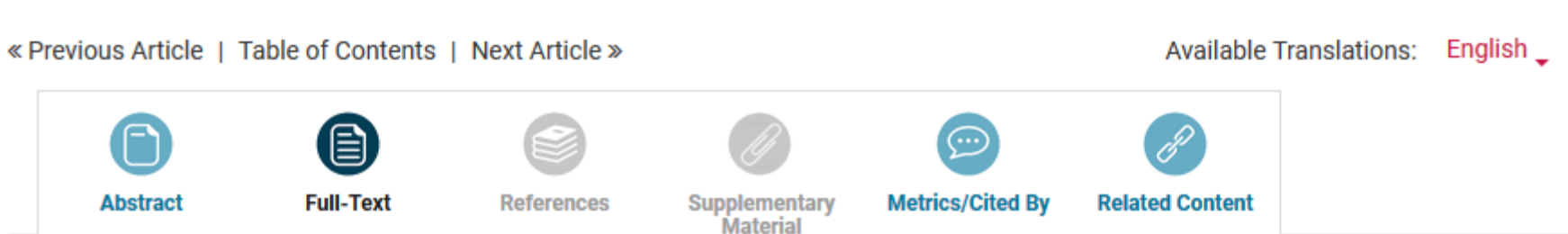
- Programa de Epidemiología Aplicada de Campo, Centro Nacional de Epidemiología, Instituto de Salud Carlos III, Espagne
- European Programme for Intervention Epidemiology Training
- Delegación Territorial de León, Espagne

Correspondence:

View Citation

« Previous Article | Table of Contents | Next Article »

Available Translations: English

L. E. Visser², L. C. González Perez¹, J. Ramos Tejera³, A. C. Berjón Barrientos³Y. Vergara Guerrero³, F. Martínez Navarro¹¹ Programa de Epidemiología Aplicada de Campo, Centro Nacional de Epidemiología, Instituto de Salud Carlos III, Espagne² European Programme for Intervention Epidemiology Training³ Delegación Territorial de León, Espagne

Introduction

Mumps is an acute viral disease, whose commonest symptom is painful swelling of one or both parotid glands. Mumps in childhood tends to be mild and about 30% of infections are asymptomatic (1,2). Systemic infection, affecting gonads, pancreas, and the central nervous system, is commoner in postpubertal patients.

Immunisation programmes against mumps have reduced the number of reported cases and influenced their age distribution. Reports from the United States show a shift in the age of peak incidence of mumps from children aged 5 to 9 years in the prevaccine era to the 10 to 19 year old age group as vaccination coverage has increased (3-5).

Notification of cases of mumps to the Sistema de Enfermedades de Declaración Obligatoria (EDO) has been mandatory in Spain since 1982 and vaccination against mumps began the same year. A clear decline in the incidence of reported cases has been apparent since 1985, when national vaccination coverage levels reached 80%. In Spain mumps vaccine is given at the age of 15 months together with measles and rubella vaccines since 1982.

Increased numbers of cases and outbreaks of mumps appeared in several autonomous communities in 1995. An outbreak of mumps in the province of - where reported vaccination coverage for mumps has been high in recent years - began in November 1995. The Epidemiology Section of the Servicio Territorial de Sanidad y Bienestar Social of León investigated the extent and duration of the outbreak and evaluated the effect of a vaccination control programme.

Methods

The province of León consists of 37 Zonas Básicas de Salud, with 215 municipalities and 521 248 inhabitants (Servicio Territorial de Sanidad y Bienestar Social of León and the Centro Nacional de Epidemiología, Madrid). A case of mumps was defined as "A person who lives, works, or studies in the province of León with unilateral or bilateral symptoms of parotitis, or jaw swelling between 1 November 1995 and 1 July 1996. Besides relying on notification to EDO, health personnel in the province sought cases of mumps actively. All physicians in the area were requested to report suspected mumps cases.

A questionnaire was developed to ask for the age and sex of cases, their place of work or study, vaccination status (with date of vaccination, and whether confirmed with personal vaccination record or municipal register), symptoms and complications of the disease, and possible contacts with other people with the same symptoms. Reporting physicians completed questionnaires on behalf of patients.

Patients or their parents were asked about vaccination for mumps. We considered cases as vaccinated if they could provide evidence of vaccination, " doubtful " if no evidence could be provided, and " unknown " if no information was provided on the questionnaire. Some people were vaccinated during the outbreak, and we considered cases as vaccinated if they had had one dose of the vaccine at least four weeks before being diagnosed with parotitis (2).

We used the screening method to estimate the vaccine efficacy. The formula is , in which p is the proportion of the total population vaccinated for the disease, and c the proportion of cases of the disease who are vaccinated (6-8).

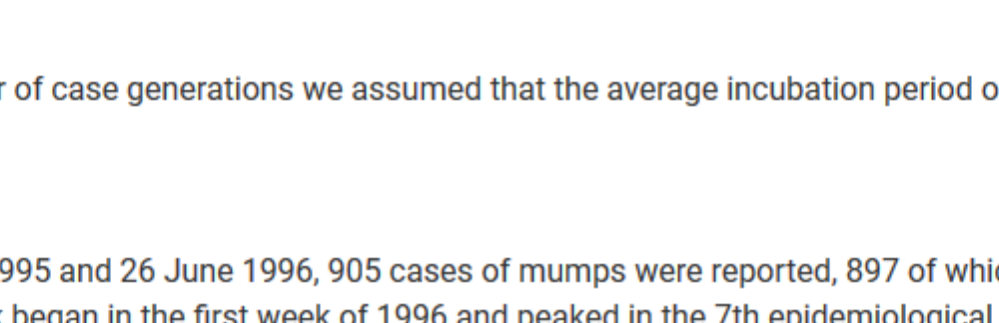
The effect of the vaccination programme on the age distribution of cases and the symptoms experienced were studied.

To estimate the number of case generations we assumed that the average incubation period of mumps was three weeks.

Results

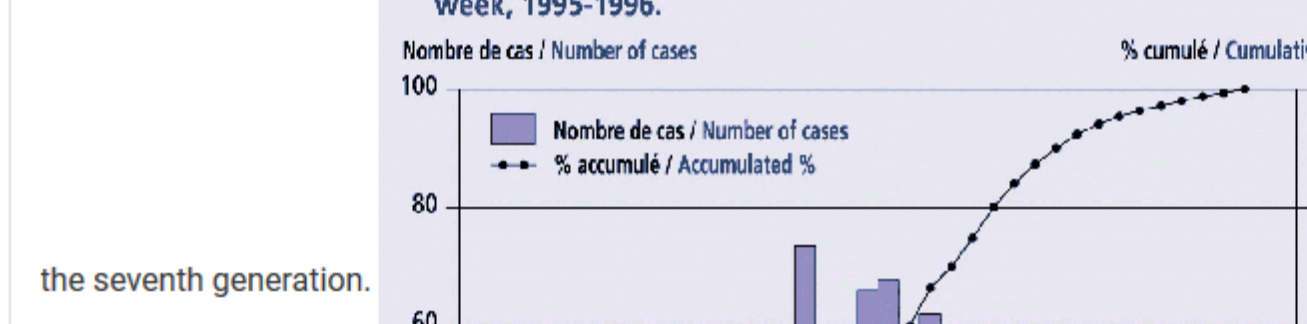
Between 1 November 1995 and 26 June 1996, 905 cases of mumps were reported, 897 of which fulfilled the case definition. The outbreak began in the first week of 1996 and peaked in the 7th epidemiological week of 1996. The median case was on 12 March and 50% of the cases were reported between 15 February and 14 April 1996, the last case was reported on 8 June 1996 (figure 1). Thirteen generations of cases were observed; the peak occurred during

the seventh generation.



One hundred and five different localities reported cases, with the largest single number in the capital León (257 cases). Thirty municipalities had only one case, and only three reported more than 50 cases.

The attack rate (AR) for the province was 0.17%, with a range for the affected Zonas Básicas de Salud between 0.01% and 0.64%. Six of the 37 Zonas were unaffected. The outbreak began with six cases who lived in different municipalities but close to each other. Figure 2 shows the spread of the outbreak through different generations throughout the province.



Over half (57%; 507) of the cases were male and 43% female (389 cases) with a male female ratio of 1:3, the sex of one case was unknown. The mean age of the cases was 17.2 years (standard deviation (s.d.) 7.3 years, range between 1 and 92 years), the mode and median age coincided at 16 years, and 76 % of the cases were aged between 10 to 19 years. The highest age specific attack rate was in people between 15 and 19 years (AR 1.41%; table 1).

Tableau 1 / Table 1: Distribution par âge et taux d'attaque des cas d'oreillons dans la Province de León / Age distribution and attack rate of the cases of mumps in the Province of León.

Groupe d'âge en années Age group in years	Nombre de cas Number of cases	Fréquence en % Frequency in %	Taux d'attaque en % Attack Rate in %
< 1	0	0	0
1 - 4	11	1.2	0.05
5 - 9	40	4.5	0.13
10 - 14	136	15.2	0.38
15 - 19	544	60.6	1.41
20 - 29	103	11.5	0.13
> 29	34	0.5	0.01
Inconnu / Unknown	29		
Total	897		0.17

All cases had parotitis, 519 cases (58%) fever, 513 cases (57%) general malaise, 354 cases (39%), headache, and 11 cases (1%) rash. The reported complications were meningitis in 11 cases (1%) and orchitis in 35 cases (7% of the male cases). Complications were commoner in males (9%) than for females (1%) ($p < 0.001$) and in older age groups: meningitis was commonest between 20 and 29 years of age and orchitis at 10 to 14 years old.

Eighty-one per cent of the cases (731) were schoolchildren or students, and most attended from different Zonas Básicas de Salud. Sixty-two schools had more than one case and had students from an average of 3.7 different municipalities. Forty-five cases were associated with the most affected school. Only 11 catered for children of only one municipality. Sixty-three of the 65 first cases in particular Zonas de Salud were students. Sixteen of the 26 of these children whose school was known were at school with children from other zones where the outbreak started earlier.

Using our definition of a positive vaccination status, 87% (783) cases were not vaccinated. Among children under 10 years of age the majority of the cases were vaccinated, in contrast to children aged 10 to 14 years, 54% of whom were not vaccinated. Eighty-seven per cent of the cases whose age was known were born before the introduction of vaccination programmes in 1982 and had not been included in the immunisation programme.

Complications were much more commonly reported in unvaccinated cases (6% compared with 1% in vaccinated cases), which was significant even when controlled for age ($p = 0.04$). Only one of the 11 cases of meningitis had been vaccinated (a boy of 14 years old) and none of the 35 cases of orchitis had been vaccinated.

The coverage of mumps vaccine among children aged 1 to 5 years is 98.7%, and the proportion of cases with documented vaccination in this age group 63.6%. We infer a vaccine efficacy of 97.7%. For children aged 5 to 10 years we estimate that 80% are vaccinated. With 55% of the cases in this age group being vaccinated the vaccine efficacy is 69.4%.

Discussion

This study illustrates the impact of the vaccination programme on the age distribution of mumps cases in the population. The outbreak's greatest effect was on age cohorts not included in existing vaccination programmes, who had had fewer opportunities to acquire natural infection due to the reduction of virus transmission associated with the introduction of vaccination. Children under 10 years of age have grown up at a time of good implementation of the vaccination programme and high coverage. Children aged 10 to 15 years were born when the vaccination programme was gradually being introduced and those older than 15 years old were born before the programme existed in the Autonomous Community. Eighty-seven per cent of the unvaccinated cases were excluded from the vaccination programme by virtue of their age. Those most affected by the disease were aged 15 to 19 years. The outbreak can therefore be related to the accumulation of susceptible people. Complications were reported frequently because cases tended to be older.

Large numbers of susceptible children and adults may be exposed to circulating virus in schools. Schools with students from different areas can therefore contribute to the extension of the outbreak to different geographical areas, as can other venues where adolescents meet - for example, discotheques and youth clubs.

In this study we estimated the vaccine efficacy by the screening method, which is less precise than through a population study. Bias related to case definition, vaccine status definition, and case finding could all influence the vaccine efficacy estimate. Our case definition was not very sensitive and cases are likely to have been missed, but publicity in the area may have helped case finding. Records of vaccination status are generally well kept in Spain, but this may have been less common in the first years of the vaccination programme or among people who were vaccinated some time ago. This may have caused bias in identifying the vaccination status of older cases. We also had no information about previous mumps infections. All these limitations may have led to a lower estimate of the true vaccine efficacy. The lower estimated vaccine efficacy in older age groups found in our study may also suggest waning immunity with time, which needs further study (9).

To avoid outbreaks of mumps in Spain in the future specific interventions for cohorts born before the vaccination programme was introduced need to be evaluated. Schools could be used for specific interventions to control outbreaks.

As Spain has only recently reached high coverage levels nationally, an increase in the number of susceptible people towards levels that will facilitate an outbreak can be expected in other areas of the country. Mathematical modelling will be useful to estimate the expected period before the next outbreak occurs. The relative contributions of primary vaccine failure and secondary vaccine failure (i.e. waning immunity) to continuing mumps activity needs further evaluation. The introduction of a two dose schedule of measles, mumps, and rubella (MMR) vaccine in different Autonomous Communities will help prevent mumps outbreaks in highly vaccinated populations.

To evaluate the implementation of this second dose schedule, case control studies of future outbreaks of mumps are recommended and a timely and sensitive surveillance system to evaluate the incidence of mumps and detect outbreaks is essential.

References:

- Bum SG, Litman N. Mumps virus. In: Mandell GL, Douglas RG, Bennett JE, *Principles and practice of infectious disease*. New York: Churchill Livingstone. 1995: Chapter 135: 1260-65.
- Weible RE. Mumps vaccine. In: Plotkin SA, Mortimer EA, editors. *Vaccines*. Philadelphia: Saunders Company. 1988.
- Benenson AS. *Control of Communicable Disease Manual*, 16th edition. Washington DC, American Public Health Association. 1995: 315-7.
- Centers for Disease Control. Mumps prevention. *MMWR Morb Mortal Wkly Rep* 1989; **38**: 388-92.
- Cochi SL, Preblud SR, Orenstein WA. Perspectives on the relative resurgence of mumps in the United States. *Am J Dis Child* 1988; **142**: 499-507.
- Orenstein WA, Bernier RH, Dondero TJ, Hinman AR, Marks JS, Bart KJ, Sirotkin B. Field evaluation of vaccine efficacy. *Bull World Health Organ* 1985; **63**: 1055-68.
- Cutts FT, Smith PG, Colombo S, Mann G, Aschero A, Soares AC. Field Evaluation of measles vaccine efficacy in Mozambique. *Am J Epidemiol* 1990; **133**: 349-55.
- Halloran ME, Haber M, Longini IM Jr, Struchiner J. Direct and indirect effects in vaccine efficacy and effectiveness. *Am J Epidemiol* 1991; **133**: 323-31.
- Hersh BS, Fine PE, Kent WK, Cochi SL, Kahn LH, Zell ER et al. Mumps outbreak in a highly vaccinated population. *J Pediatr* 1991; **119**: 187-93.