

MUMPS IN A COMMUNITY WITH LOW VACCINATION COVERAGE IN THE NETHERLANDS

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The incidence of mumps in the Netherlands has increased since August 2007. Until mid May 2008, 89 individuals were found positive for mumps virus infection by laboratory testing at the Centre for Infectious Diseases Control (CIb) of the Dutch National Institute for Public Health and the Environment (RIVM), compared to less than 10 cases per year between 2005 and 2007. Mumps is not a notifiable disease in the Netherlands and surveillance is mainly based on monitoring laboratory test requests and their results offered by the CIb and other laboratories. As only a minority of cases is offered laboratory testing, however, the extent of the current mumps outbreak is unknown.

Background

Mumps is an acute infectious disease caused by an enveloped RNA virus that belongs to the genus *Rubulavirus* in the family *Paramyxoviridae* [1]. It is endemic worldwide and can occasionally cause outbreaks. The introduction of mumps vaccination has led to a decrease of mumps cases in the Netherlands since the late 1980s. Some 30% of mumps infections remain asymptomatic. Clinical manifestations include parotitis, often after a short prodromal phase of low-grade fever, malaise, anorexia and headache. The most common complications are meningitis, epididymo-orchitis, orchitis, oophoritis and encephalitis [2].

Mumps vaccination in the Netherlands has since 1987 been available through the national immunisation programme which includes the measles-mumps-rubella vaccine (MMR). This vaccine contains the Jeryl-Lynn mumps JL2 and JL5 vaccine strains, produced by the Netherlands Vaccine Institute (NVI) under licence of MSD. The first vaccination is scheduled at the age of 14 months with a second dose at the age of nine years. Since the introduction of the vaccine, less than 50 cases have been reported and only few patients with mumps have been admitted to a hospital annually [3,4]. The circulation of mumps virus in the Netherlands appears to have been very limited since 1987.

Mumps outbreak in the Netherlands 2007/2008

The median age of the laboratory confirmed mumps cases diagnosed at the CIb between 1 August 2007 and 15 May 2008 (n=89) was 13 years (range 2-56 years). Fifty-five (62%) of the reported cases were males. We do not yet have a clear overview about complications attributable to mumps.

The geographic distribution of the cases is shown in Figure 1. The cases are mostly resident in low vaccination coverage areas in the so-called Bible Belt (see Figure 2); the cluster in the south of the country involved anthroposophists. Another recent outbreak involving anthroposophists (in that case it was an outbreak of measles) has been reported in Austria, Germany and Norway [5].

Of 87 cases whose vaccination status is known, 58 (67%) were unvaccinated and 29 (33%) were vaccinated (13 cases vaccinated once and eight cases twice). Five cases (6%) were too old to have been vaccinated. For 39 unvaccinated cases who would have been eligible for vaccination, the reasons for non-vaccination were clearly stated. For 36 (92%) of them, the main reason for not being vaccinated was religion; all 36 were orthodox Reformed Christians. The estimated proportion of vaccinated cases is thought to be biased because laboratory testing was recommended preferentially for patients with a history of mumps vaccination.

Genotype D was the most frequently isolated genotype among the cases studied so far. Vaccinated cases were predominantly confirmed by PCR, while unvaccinated cases were confirmed both by PCR and by mumps virus specific IgM testing.

Discussion

Mumps outbreaks have been reported during the last years throughout Europe [6-10] and elsewhere [11]. In the Netherlands, a large mumps outbreak occurred in 2004 at an international school, with an attack rate of 12% among students vaccinated according to the Dutch schedule [Brockhoff, unpublished data].

The high rate of vaccine failure in the outbreak described here may have been related to a high force of infection at the school campus. However, it does raise concern about the effectiveness of mumps vaccination in the Netherlands.

The use of any of the 11 known vaccine strains, except Rubini, is supported by the WHO [12]. However, in recent years, evidence has accumulated for relatively frequent mumps vaccine failure, leading to doubts about the long-term effectiveness of mumps vaccines. Two-dose mumps vaccine failure caused a large mumps outbreak in the United States in 2006, with over 6,000 cases, the majority (63%) of whom had been vaccinated twice [10]. Possible explanations for this include waning immunity, possible mismatches

between the vaccine strain and a circulating wild-type virus strains and the absence of boosting due to natural infection.

During a large outbreak in the United Kingdom (UK) in 2004-2005, some evidence of waning immunity was found with the estimated vaccine effectiveness declining from 99% in five- to six-year-olds to 86% in 11- to 12-year-olds [13] (the UK Childhood Vaccination Schedule advises MMR vaccination at the age of 13 months and four years). Recent data from a nationwide mumps outbreak in Moldova in 2007 and 2008 found that a high proportion of cases had been vaccinated with one dose in the past [9].

A number of outbreaks of vaccine-preventable diseases have been described in the Dutch Bible Belt in the past. A poliomyelitis outbreak occurred among unvaccinated individuals in 1978 and between 1992 and 1993 in the area, involving 110 and 71 patients, respectively

[14,15]. In 1999-2000, a widespread measles outbreak occurred in the same area, involving 3,292 reported cases, most of whom were not vaccinated [16]. More recently, in 2004, the same area was home to a large rubella outbreak that led to at least 11 congenitally infections with birth defects, and that outbreak spread to Canada [17, and S. Hahné, personal communication]. As the vaccination coverage continues to be below recommended levels,

further outbreaks of vaccine-preventable diseases are expected in this region [18].

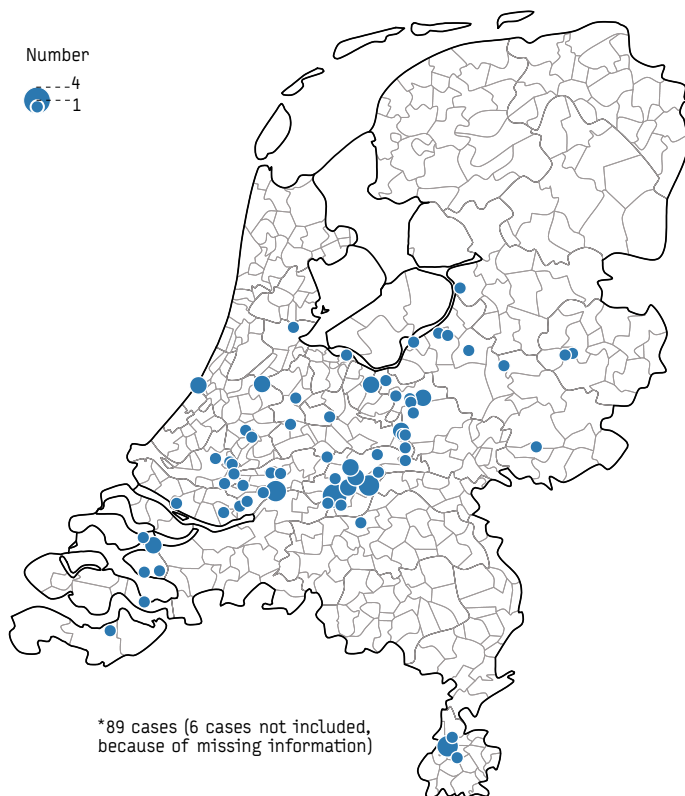
The current situation, with a large outbreak in unvaccinated individuals and some spread to those vaccinated, provides a unique opportunity for further research on the mumps vaccine effectiveness, 20 years after the introduction of mumps vaccination in the Netherlands. However, routinely available data on the mumps outbreak does not allow unbiased estimation of the attack rates among vaccinated and unvaccinated population and the vaccine effectiveness. We are therefore planning an analytical epidemiological study including laboratory investigations.

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FIGURE 1

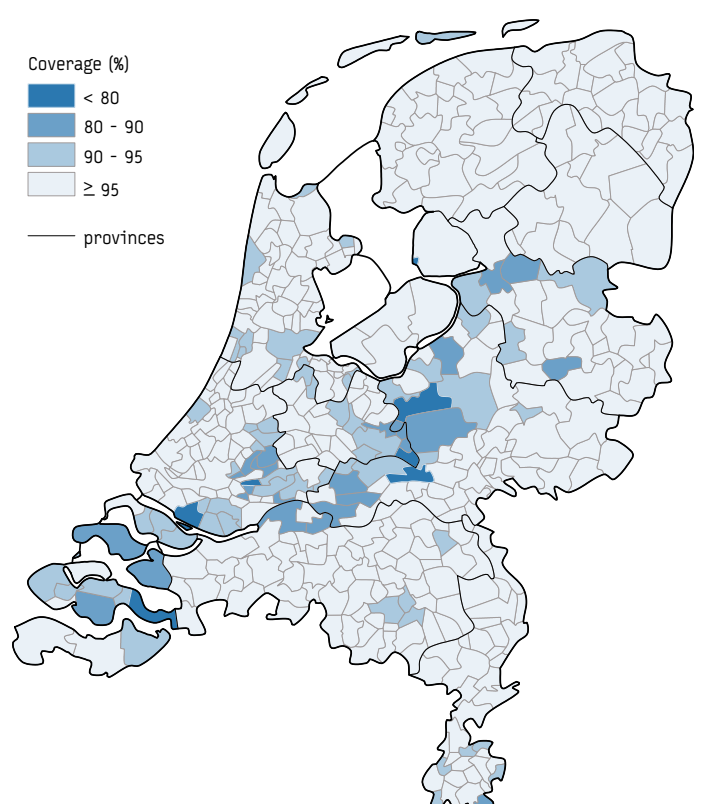
Geographical distribution of notified mumps cases in the Netherlands from 1 August 2007 to 15 May 2008 (n=89*)



Source: Centre for Infectious Diseases Control, Rijksinstituut voor Volksgezondheid en Milieu (RIVM), the Netherlands

FIGURE 2

Geographical distribution of measles-mumps-rubella vaccination coverage by municipality at the age of two years in the Netherlands, 2008



Source: Centre for Infectious Diseases Control, Rijksinstituut voor Volksgezondheid en Milieu (RIVM), the Netherlands

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