

Surveillance and outbreak reports

MUMPS OUTBREAK IN YOUNG ADULTS FOLLOWING A FESTIVAL IN AUSTRIA, 2006

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Mumps is not a mandatorily notifiable disease in Austria. However, in the first week of May 2006, a sudden increase in serologically confirmed cases of mumps, confined to three public health districts of the southern Austrian province of Carinthia, was identified by the Austrian Reference laboratory for MMR. An epidemiological investigation of this cluster of mumps cases was performed. A total of 214 cases fulfilled the outbreak case definition; 143 cases were laboratory confirmed and 71 cases were epidemiologically linked and fulfilled the clinical picture of the case definition. The vaccination status was known for 169 patients. Nearly half of the cases for whom the vaccination status was known occurred in non-vaccinated persons, another 40% were vaccinated with one dose of the vaccine and 11% had received two doses. Only four mumps cases occurred in children aged 14 years or younger, indicating that the vaccination coverage and the acceptance of the recommended childhood vaccinations have strongly improved within the past 15 years. Vaccination scheme failure but not vaccine failure is primarily to blame for this mumps outbreak.

Introduction

Mumps is an acute viral infection characterised by fever and non-suppurative swelling of the salivary glands; an estimated 20-30% of cases are asymptomatic. Complications may include inflammation of the testicles or ovaries, and of the central nervous system manifesting as meningitis and meningo-encephalitis, which can lead to deafness. During the pre-vaccine era, nearly everyone experienced mumps, and 90% of cases occurred among children aged under 15 years.

In Austria, mumps is not a mandatorily notifiable disease. Data on disease occurrence in Austria are mainly based on data of serologically confirmed cases provided by the Institute of Virology of the Medical University of Vienna, the Austrian reference laboratory for mumps, measles and rubella (MMR). Between 2001 and 2005, the median number of annual serologically confirmed mumps cases was 20, with a range from 9 to 30 cases. Furthermore, data can be gathered from hospital discharge statistics. Based on the World Health Organization's (WHO) International Classification of Diseases - ICD-10 code 10th Revision (coding numbers B26.0, B26.1, B26.2, B26.3, B26.8, B26.9) [1], the annual number of hospitalisations due to mumps between 2003 and 2005 ranged from 18 to 27 with a median of 27. Both figures are only a tip of the iceberg as most cases might not be detected via these two sources, nevertheless they are helpful to detect outbreaks.

Vaccination against mumps was introduced into the childhood vaccination schedule in Austria in 1974. Table 1 illustrates the mumps immunisation policy in Austria since 1974 until present. For controlling a mumps outbreak, a post-exposure vaccination is recommended for susceptible contact persons - unvaccinated or not sufficiently vaccinated persons - within three days post-exposure [2]. In case of an ongoing outbreak the susceptible persons of the region where the outbreak takes place are offered vaccination (mass vaccination).

The outbreak

In the first week of May 2006, a sudden increase in serologically confirmed cases of mumps, confined to three public health districts

TABLE 1

Active mumps immunisation in Austria between 1974 and 2008

Year of introduction	1974	1994	2001	Since 2003
Type of vaccine	bivalent; mumps, measles (MMII)	trivalent; mumps, measles, rubella (MMR)	trivalent; mumps, measles, rubella (MMR)	
Produced by	Merck Sharp & Dohme	Pasteur Merieux Connaught	Glaxo Smith Kline	
Dosage	1 dose scheme: dose: at age 15 months	2 doses scheme: dose 1: at age 15 months dose 2: at age 6 years	2 doses scheme: dose 1: at age 15 months dose 2: at age 6 years	2 doses scheme: dose 1: in 2nd year of life dose 2: at least 4 weeks later
Vaccine strain	Jeryl Lynn strain	Jeryl Lynn strain	RIT 4385 mumps strain derived from the Jeryl Lynn strain	

of the southern Austrian province of Carinthia, was identified by the Austrian Reference laboratory for MMR. Sixteen cases of laboratory-confirmed mumps were observed in the first week of May 2006; no cases had been identified in these three public health districts in the previous months of 2006. Comparing with data from all of Austria for the same period one case of laboratory confirmed mumps had been detected in May 2001, whereas no cases of mumps had been recognized in the same period in the years 2002 to 2005. The regional health authorities mandated the Austrian Agency for Health and Food Safety (AGES) to perform an epidemiological investigation of this cluster of mumps cases. An initial case series investigation implicated the attendance at an Easter youth festival on 16 April in one of the three affected public health districts as the common link among the index cases from Carinthia. The following report is a follow-up of a previously published preliminary report after the completion of the investigation [3,4].

Methods

Case definition

In this outbreak a confirmed case was defined (1) as a patient with self-limited swelling of the parotid without another apparent cause, or with meningitis or orchitis, (2) and a clinical onset of at least 10 days after 16 April 2006, (3) with a serological confirmation of mumps infection or virus isolation from a saliva sample or a throat swab AND (4) any epidemiological link to the Easter festival such as contact with a person having attended the

festival or contact with a contact person of an infected individual related to the outbreak.

A probable case of the outbreak was defined (1) as a patient with self-limiting swelling of the parotid gland without another apparent cause, or with meningitis or orchitis (2) and a clinical onset of at least 10 days after 16 April 2006 AND (3) any epidemiological link to the Easter festival.

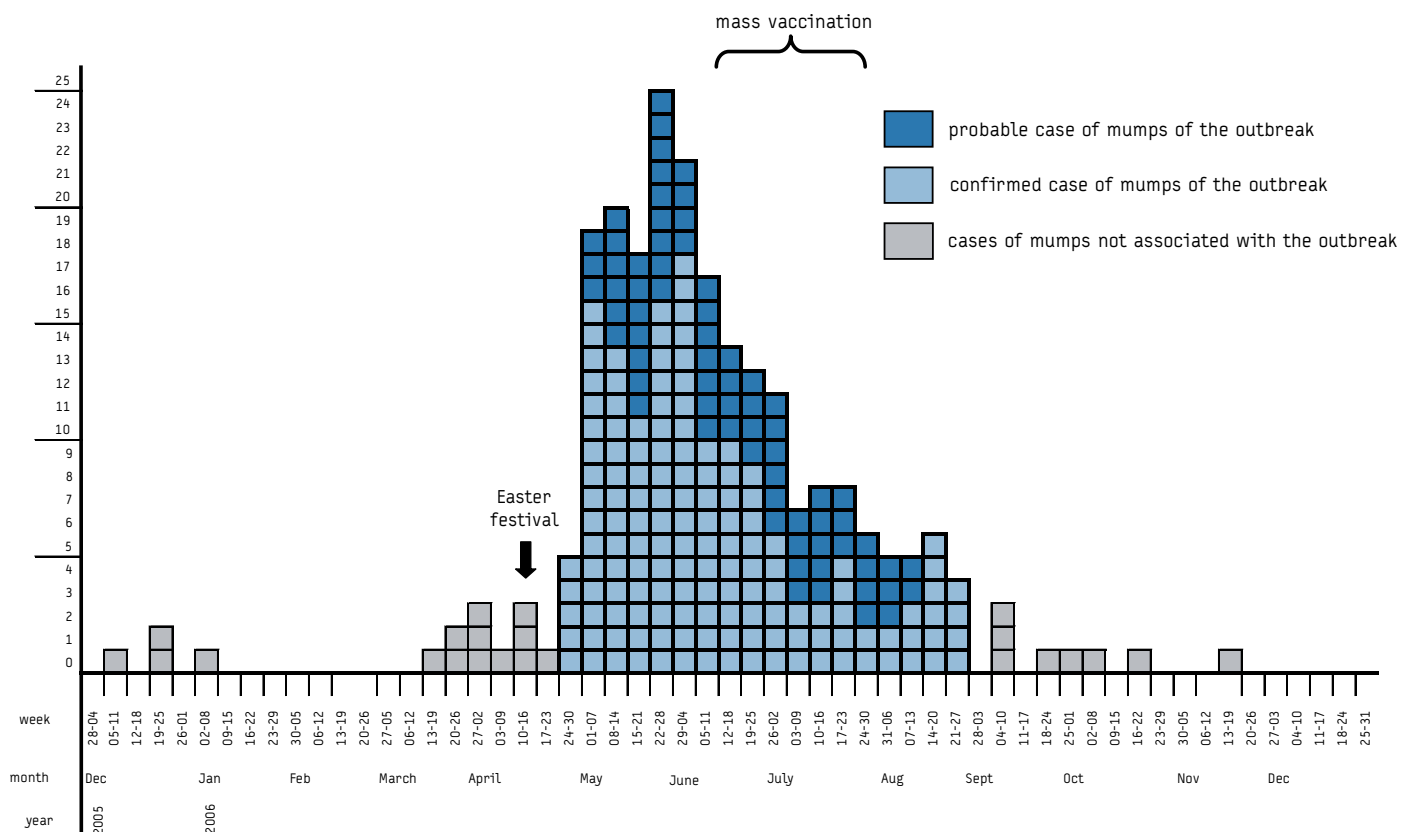
Case finding

The outbreak investigation team acquired data on serologically confirmed cases of mumps from the Austrian reference laboratory. In addition active case finding was performed by asking general practitioners and clinicians of hospitals of the three affected provinces to notify all clinical cases of mumps having occurred since the beginning of May to the local public health authorities. Physicians were also asked to collect blood samples from all incident cases of parotitis and orchitis for serological examination.

A telephone interview of mumps cases was performed to obtain information on vaccination status including the number of doses received, based on the vaccination certificate and clinical manifestation such as parotitis, orchitis or meningitis, hospitalisation, history of exposure such as attendance of the Easter festival, contact to a case of mumps having attended the festival and, on demographic data.

FIGURE 1

Mumps cases in Austria by week of onset of clinical symptoms, December 2005 to December 2006 (n = 237; outbreak cases = 214, including 143 laboratory-confirmed and 71 probable cases)



Results

A total of 214 cases fulfilled the outbreak case definition including 143 confirmed and 71 probable cases. The epidemic curve of the outbreak illustrates a sudden increase in the number of cases within the first week of May 2006, two weeks after an Easter festival attended mainly by adolescents in a small village in Carinthia. The number of cases peaked in the fourth week of May and returned to the endemic level at the end of August. Eight cases of laboratory confirmed mumps recognized in the months September to December 2006 had no relation to the outbreak.

Between the end of May and the end of July, the MMR vaccine was offered to all residents of Carinthia (population approximately 550,000) free of charge by local health authorities, physicians and hospitals. Approximately 2,000 people were vaccinated (Figure 1).

Geographical distribution

Five of Austria's nine provinces were affected by the outbreak (Figure 2): Carinthia had 134 cases, 76 (57%) of these were serologically confirmed, Vienna had 36 cases, 32 (89%) serologically confirmed, Lower Austria had 35 cases (30 cases, 86% serologically confirmed), Salzburg had eight cases (five serologically confirmed), and one additional serologically confirmed case was from Styria. The latter was in a 31 year old male patient who had had direct contact with an outbreak case in Carinthia.

Demographic features and complications

In total 91% of all cases (195/214) were younger than 36 years (median: 24; range 6 to 69 years). The majority of cases (80%) occurred in persons between 16 and 30 years of age with a peak in the age group of 21 to 25 years (42%). There was no case in children under six years; two cases were in the age group six to 10 years. The female to male ratio was 1:1.74; in the age group 16 to 30 years female and male cases were almost equally distributed. In total there were complications in 36 (17%) patients, eight of those suffered from meningitis (Table 2).

Vaccination status

The vaccination status was known for 169 patients (Table 2). Nearly half of the cases for whom the vaccination status was known

occurred in non-vaccinated persons, another 40% were vaccinated with one dose of the vaccine and 11% had received two doses.

Discussion

The described mumps outbreak involving 214 cases is the largest reported in Austria to date. However, as mumps is not a mandatorily notifiable disease in Austria, the number of cases may underestimate the true number of cases in the outbreak. In the past years, mumps virus activity observed in Austria was very low, and it has to be considered that the number of laboratory confirmed endemic, outbreak-unrelated cases may include healthy persons who have been tested for mumps antibodies following mumps vaccination.

Considering the minimum incubation period of 10-14 days, the mumps outbreak probably originated with virus transmissions to susceptible individuals at a village festival. Traditional festivals provide opportunities for sharing cutlery, glasses, plates, and for a variety of close personal contacts allowing for possible transmission of mumps virus to susceptible persons. Gerstel et al. recently reported on an outbreak involving 19 cases originating from a village festival in Spain [5]. As in this outbreak, we were unable to perform an analytical study for identifying risk factors for virus transmission.

Although mumps vaccination has been part of the Austrian national immunisation schedule since 1974, 83 of 169 (49%) cases interviewed were unvaccinated. Whether the absence of sufficient antibody titers despite vaccination (non-responder), or the absence of neutralizing antibodies specific for this mumps outbreak's causative viral strain was responsible for the susceptibility to infection in the remaining 86 vaccinated cases cannot be answered conclusively [6]. We hypothesize that susceptibility to mumps infection in those vaccinated is due to the lack of compliance with the recommended two-dosage scheme, i.e. administration of only one vaccine dose is documented for 68 vaccinated cases. However, in this context it has to be considered that until the mid 1990s only one dose of the measles mumps vaccine was recommended in Austria. The fact that 18 of 169 cases had received two doses accounts for a vaccine efficacy of 89.3% for the Jeryl-Lynn strain with a two-dose scheme, which should be sufficient to induce herd immunity [7]. An epidemiological investigation of seven institutional outbreaks of mumps in Singapore found a vaccine efficacy of 80.7% for the Jeryl-Lynn strain, 54.4% for the Urabe strain, and 55.3% for the Rubini strain mumps vaccine; Rubini strain mumps vaccine conferred no protection and has since been deregistered in Singapore [8].

Only four mumps cases occurred in children aged 14 years or younger, indicating that the vaccination coverage and the acceptance of the recommended childhood vaccinations have strongly improved within the past 15 years. The fact that the majority of cases occurred in non- or only once vaccinated young adults – 75% out of the unvaccinated cases (62/83) were between 16 and 30 years old – suggests susceptibility to mumps virus infection in this age group of the Austrian population.

The belief that mumps is only a harmless disease and the risk of vaccine side effects are the leading arguments of groups opposing the MMR vaccination program. Therefore it is important to inform the public about the safety of the vaccine and possible complications of mumps. Orchitis, the most common complication, occurs in 20-30% of affected post-pubertal males [2]. In the current

FIGURE 2

Mumps cases by public health districts in the affected provinces Vienna, Lower Austria, Carinthia, Salzburg and Styria, outbreak in Austria, May 2006 to end of August 2006, (n= 214)

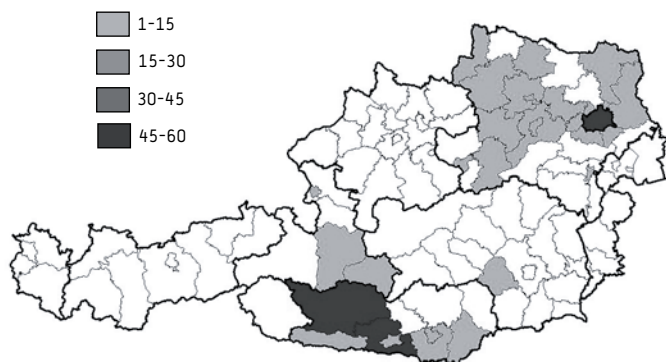


TABLE 2

Mumps cases by demographic features, complications, vaccination status and provincial residence outbreak in Austria, May 2006 to end of August 2006, (n= 214)

Variables under study	Carinthia n=134	Lower Austria n=35	Vienna n=36	Salzburg n=8	Styria n=1	Total n _{total} =214
Age (median; min, max)	24 (9-69)	22 (15-57)	25 (6-59)	22 (21-29)	31 (31-31)	24 (6-69)
Sex m (%) / f	80 (59.7) / 54	23 (65.7) / 12	26 (72.2) / 10	6 (75) / 2	1 (100) / 0	136 (63.6) / 78
Hospitalization (%)	20 (14.9)	16 (45.7)	8 (22.2)	4 (50)	0 (0)	48 (22.4)
Duration of hospitalisation (median, range)	5 (4-7)	6 (3.5-9)	7 (3-8)	3 (2-4)	-	5 (4-8.5)
Serologically confirmed (%)	76 (56.7)	30 (85.7)	32 (88.9)	5 (62.5)	0 (0)	143 (66.8)
Complication (%)	14 (10.4)	11 (31.4)	9 (25)	2 (25)	0 (0)	36 (16.8)
Orchitis	7	5	8	1	0	21
Meningitis	4	3	0	0	0	7
Pancreatitis	2	2	1	1	0	6
Meningitis+Orchitis	1	0	0	0	0	1
Pancreatitis+Orchitis	0	1	0	0	0	1
Vaccination status known	n=107	n=27	n=26	n=8	n=1	n_{total}=169
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
No vaccination	53 (49.5)	13 (48.1)	14 (53.8)	3 (37.5)	0	83 (49.1)
1 vaccine dose	45 (42.1)	8 (29.6)	10 (38.5)	4 (50)	1	68 (40.2)
2 vaccine doses	9 (8.4)	6 (22.2)	2 (7.7)	1 (12.5)	0	18 (10.7)

mumps outbreak, 23 of 136 (17%) male patients suffered from orchitis. Symptomatic aseptic meningitis occurs in up to 10% of mumps cases; patients usually recover without sequelae [2]. Eight of the 214 (3.7%) patients developed meningitis. Pancreatitis, usually mild, occurs in 4% of cases [2]. Seven of the 214 (3.3%) cases had pancreatitis.

Conclusions

Our data indicate that the one-dose scheme failed to generate sufficient mumps immunity in the Austrian population. This mumps outbreak clearly demonstrates that additional MMR vaccination campaigns are necessary, especially targeting the age group of adolescents and young adults in order to avoid mumps and measles outbreaks in the future and for achieving the vaccine coverage required for herd immunity. In contrast to some other recent European outbreaks, vaccination scheme failure but not vaccine failure is primarily to blame for this mumps outbreak [9,10,11]. Future seroprevalence studies or the implementation of a notification system for vaccination data are required to identify susceptible groups to prevent future outbreaks of measles, mumps or rubella in Austria [12,13]. Similar to the situation of food-borne outbreaks, there should also be a clear legal basis requiring the epidemiological investigation of clusters of vaccine-preventable diseases not presently reportable under the Austrian Public Health Act. Otherwise, data protection laws can be used as a false pretence for hampering investigation of such outbreaks.

*Authors' correction

On 15 February 2008, the authors corrected four numbers (indicated in blue) in Table 2 of this article.

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