

Rapid communications

MEASLES OUTBREAK IN GIBRALTAR, AUGUST–OCTOBER 2008 – A PRELIMINARY REPORT

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To date, 276 clinical diagnosed cases of measles have been notified in Gibraltar. The outbreak, which has been ongoing since August 2008 and affected almost 1% of the local population, unmasked errors in vaccination uptake assumptions and highlighted the need for improved data recording and research on disease transmission rates in small crowded populations.

Introduction

Gibraltar is a British Overseas Territory on the Mediterranean Sea, famous throughout the world for its history, landscape and culture. Despite its larger-than-life image, it is physically quite small, a peninsula with 4 km² of habitable area, home to around 28,000 residents, which makes it densely populated, with most people living in multi-storey apartments. The culture of Gibraltar is also very community-oriented and thus free interaction of the population on a daily basis is the norm. These factors can augment the spread of some infectious diseases. However, Gibraltar is a generally affluent nation with health indicators on par with Western Europe and good standards of public hygiene.

During the three-month period between 1 August 2008 and 31 October 2008, the Gibraltar Public Health Department was notified of 276 clinically diagnosed cases of measles. At the time of writing this report, occasional cases were still coming in. Prior

to this outbreak, no cases of measles had been notified in Gibraltar for at least ten years [1].

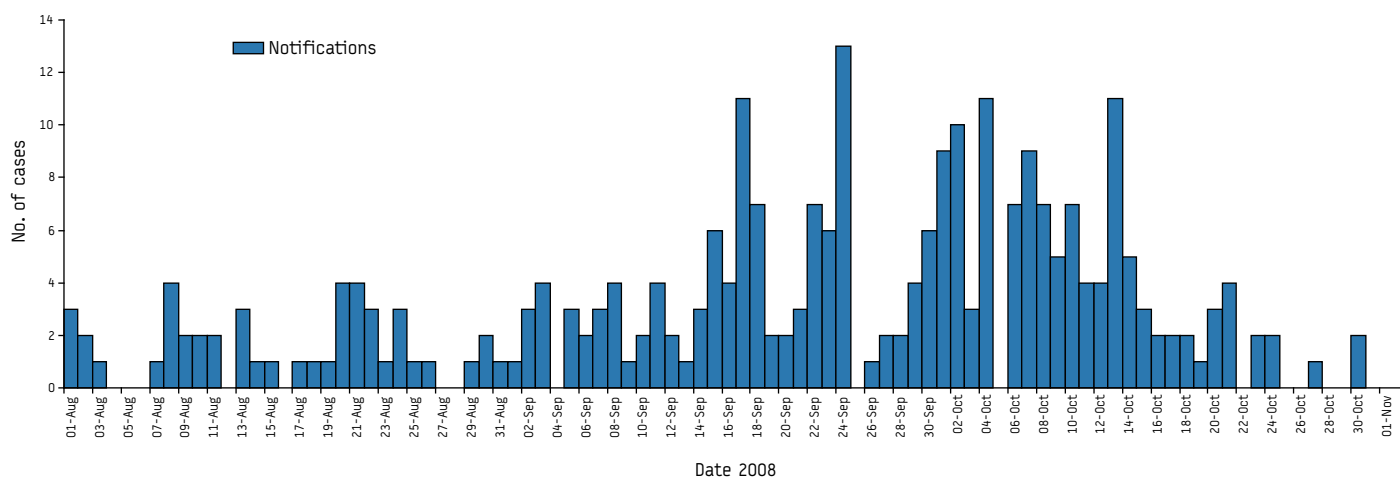
A rapid response process was put in place by the public health directorate during the second week of the outbreak. Every case clinically diagnosed as measles was notified immediately by telephone to the infection control team by family doctors, hospital doctors and emergency rooms. Infection control nurses visited every family within 24 hours, advised isolation precautions, identified contacts and obtained saliva samples. They found that in a number of families, more than one person was or had been affected although only one individual had been reported. The rapid response process thus also helped to maximise the ascertainment, but such intensity is difficult to sustain for a small nation and depends heavily on skilled staff working long hours of overtime.

Outbreak profile

After an initial period of about five weeks with 1-2 cases per day, the outbreak accelerated, averaging around 5-6 notifications per day (Figure). A pattern of mid-week peaks was observed, which is probably linked to reporting practices. It is hypothesised that community events like the Gibraltar fair (late August), opening of the school year (early September) and the National Day celebrations

FIGURE

Daily notifications of measles cases in Gibraltar (n=271*, as of 31 Oct 2008)



* The dates of notification of five of the 276 cases were not available at the time of writing.

(mid-September) encouraged extensive population mixing and fuelled the outbreak. More recent figures suggest that the outbreak may have peaked and notifications have now fallen to around 2-3 per week.

A significant majority of the cases (62%) occurred in the school-age group (five years to 19 years), with the youngest case four months-old and the oldest case 58 years-old. However, age-specific infection rates were highest in infants (Table). Only six cases occurred in people over the age of 40 years.

The typical case had high fever, followed by rash within 1-2 days, red eyes, sore throat and diarrhoea. Koplik's spots were observed in many patients. In general, the clinical course was mild with few complications. Hospital admissions were few, mostly for management of dehydration or superimposed infection, such as with *Mycoplasma pneumoniae*. No cases of nosocomial transmission or cases in health staff were reported.

Confirmation

Diagnostic serology was performed for clinical reasons in just a few cases. However as part of the outbreak investigation, almost all cases submitted oral fluid samples for investigation by the Virus Reference Department in the United Kingdom (UK). For logistic reasons, the results are somewhat in arrears. At the time of writing, 152 results had been received, of which 130 were confirmed measles (86%). Of the rest, 10 had evidence of old immunity (IgG antibodies), five were undergoing further PCR analysis and seven had no anti-measles antibodies. Results from the entire survey will form a separate body of work.

All the viruses isolated were of the Enfield genotype D4 strain. Two of the sequences have been submitted to NCBI GenBank.

Immune status

All of the 268 clinically diagnosed measles cases for whom immunisation histories have been ascertained occurred in persons who were unimmunised or were partly immunised (Table).

The measles-mumps-rubella (MMR) vaccine immunisation programme was first introduced in Gibraltar in 1989, offering a single dose to all children at the age of 18 months. In 2002, the age was reduced to 15 months and a pre-school booster dose was added, although no catch-up was organised at the time. All

public programme vaccinations are free of charge to all residents of Gibraltar. In addition, public health legislation permits giving free vaccination to non-residents when indicated in the public interest.

Childhood immunisations are generally well accepted in Gibraltar with uptakes of well over 90%. Despite the MMR scare in the early 2000s and the persistent media disquiet, it had been believed anecdotally that Gibraltar's MMR uptake was also in excess of 90%, but the scale of this outbreak and the lack of computer-based records have revealed a need to establish more precise and reliable recording systems.

A public MMR immunisation campaign was launched in the second week of the outbreak to reach all unimmunised children (i.e. under 18 years). The lower age limit was extended to include infants at the age of six months and older. Unfortunately, the campaign had to be suspended twice due to vaccine shortages caused by the contemporaneous MMR catch-up programme in the UK, but is now under way again. The initial phase of open access self-referrals has so far provided around 500 vaccinations, which would comprise about 50-60% of the target unimmunised population. A phase of proactive immunisation on a child-by-child basis has been commenced to reach the rest.

Discussion

With the successful use of vaccine over several decades and the virtual disappearance of endemic disease, elimination of measles is seen as a realistic goal for European nations [2]. Despite public efforts to maintain high levels of vaccination however, sporadic outbreaks have occurred, often a combination of disease importation [3] and existence of pockets of non-immune populations [4]. It is believed that both factors have contributed to the outbreak in Gibraltar.

It has occurred in the wake of a large measles outbreak caused by the same D4 strain in the neighbouring Spanish town of Algeciras and surrounding areas, that has been ongoing since early 2008 [5]. There are large and free movements of Gibraltar and Spanish populations every day for domestic reasons, employment and tourism. During May and June 2008, Spanish authorities notified Gibraltar of five separate cases who had local connections to Gibraltar (such as employment), but no evidence of local transmission was found when these were followed up. However,

TABLE

Measles notifications in Gibraltar showing vaccination status by age group (as of 31 Oct 2008)

Age groups	MMR status			Total (%)	Age Specific Infection Rates (per 100,000)
	Unvaccinated	Vaccinated with One dose	To be Ascertained		
Under 15 months	21	3	0	24 (9%)	4888.0
15months -4 years	11	13	0	24 (9%)	1629.3
5 years-9 years	23	9	1	33 (11%)	2122.2
10 years-14 years	44	12	3	59 (21%)	2685.5
15 years-19 years	49	30	2	81 (29%)	4497.5
20 years-29 years	32	5	2	39 (14%)	1103.6
30 years-39 years	9	1	0	10 (4%)	252.5
Over 40 years	6	0	0	6 (3%)	45.8
Total	195	73	8	276	982.3

histories of the Gibraltar index case(s) suggested that possible interaction with the Spanish population might have provided the source. No anecdotal or other evidence is available to suggest that the outbreak might have been imported to Gibraltar from other geographically or economically linked countries where measles outbreaks have been reported, such as the UK [6], Portugal [7] or Morocco [8]. It is theorised that Gibraltar's good herd immunity probably held the disease at bay for several months.

Numbers in this outbreak have been relatively large and its spread exceptionally fast when compared with accounts recently published about outbreaks elsewhere in Europe [9]. In addition, as levels of notification in any system are rarely 100%, the true outbreak size is potentially greater.

Reported total incidence rates per 100,000 population in the literature for measles outbreaks occurring in non-endemic countries vary widely, for example, 14.0 in Hesse (2005) [10], 39.0 in the Cote D'Azur (2003) [11] and 49.0 in Algeciras (2008) [5], but Gibraltar has experienced some twenty times this intensity. Whilst questions on the exact uptake of the Gibraltar immunisation programme remain, this can only account for a small part of the difference. It is contended that the real difference arose from the compact and densely urban nature of the Gibraltar community, enabling the transmission of highly communicable airborne diseases to vulnerable people with efficiency and speed. Popular folklore in Gibraltar maintains that "when one has it, then everyone gets it", but this is the first time that rapid transmission of an infectious disease to such a large proportion of the vulnerable population has been documented here. This phenomenon needs further research, as orthodox application of published estimates of attack rates for infectious diseases derived from pooled or mixed populations may be inappropriate in such island communities and result in serious underestimates of forecast impact by planners serving atypical populations.

The immunisation drive currently under way, together with existing vaccination coverage (and measles infection) should in time substantially eliminate measles susceptibility in the population of under 18 year-olds. However, as the vaccination programme was commenced in 1989, most persons over the age of 18 years will not have been immunised through vaccination. Estimates of herd immunity are difficult to compile as systematic surveillance and recording only commenced in 1998 and no public record is available of past outbreaks of measles or as to when the disease ceased to be common. If a general presumption is made (based on the low attack rates seen in the over 40 year-olds during this outbreak) that the majority of people over the age of 40 years will have been exposed to wild measles virus, this leaves a population aged between 18 and 40 who could be largely non-immune. A public health programme targeting this population needs to be considered if measles elimination is the ultimate objective. However, such a programme would be expensive (in perspective, this population outnumbers the entire child population, whose immunisation has been achieved gradually over an 18-year period), require political support and could meet with poor compliance without a preparatory education programme.

Conclusions

A report is presented of a sudden and large outbreak of measles that has rapidly affected nearly 1% of the residents of the Territory, aided by a relatively crowded population and the presence of an

apparently large number of unimmunised vulnerable people. It unmasked errors in vaccination uptake assumptions and highlighted the need to improve data recording. The institution of a rapid response strategy, albeit very demanding for staff, helped to optimise case management and maximise ascertainment.

A sustained MMR vaccination promotion campaign has in a short time reached over half the target (unimmunised child) population and further efforts are under way to reach the remainder proactively. If elimination of measles is to be the absolute goal, attention needs to be paid to extending immunisation to the vulnerable age group of 18-40 year-olds, but such a programme is likely to be resource-intensive.

Although most of the outbreak appears to have been controlled successfully, vaccine shortages and scarcity of skilled staff are matters of concern to emergency planning. Fortunately, the relative mildness of the illness did not tax the secondary care resources as it might have. Further research is needed on disease transmission rates in atypical populations like crowded urbanised neighbourhoods and in island communities, if planners are to rely on such knowledge for their forecasts.

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