MEASLES update

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MEASLES IN CANADA, 1994–1995 (as of February 14)

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From January 1 to December 31, 1994, a provisional total of 518 measles cases (1.80 per 100,000 population) was reported in Canada. This is 2.5 times greater than the total of 204 cases reported for 1993, but substantially lower than those reported for 1991 (6,178) and 1992 (3,011). The lowest annual number of cases ever recorded in Canada was in 1993. Figure 1 shows the trend in reported incidence, by month, from January 1991 to January 1995. During the past four years, the lowest measles activity (three cases) was reported in December 1994. In 1995, as of January 31, a total of nine cases has been reported.

Table 1 shows the distribution of cases by province and territory for 1994. Ontario accounted for 61.6% (319 cases or 2.97 per 100,000 population) of the total, followed by Quebec with 24.7% (128 cases or 1.77 per 100,000). Nine of the 10 provinces reported measles, and the number of cases ranged from one each in Manitoba, New Brunswick and Nova Scotia to 319 cases in Ontario. No cases were reported from Prince Edward Island, the Yukon and the Northwest Territories.

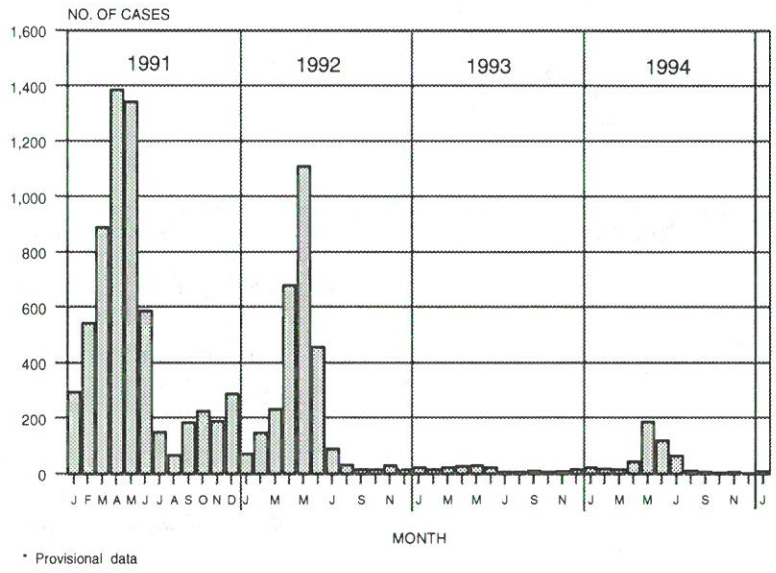
In 1994, a total of four outbreaks were reported in Canada: two in Ontario and two in Quebec. The outbreaks in Ontario peaked in May, while both the outbreaks in Quebec peaked in June and July. Brief descriptions of these outbreaks were published in previous issues of *Measles Update*[1,2,3,4].

Approximately 25% of the 1994 cases have been serologically confirmed.

In general, the epidemiologic characteristics, i.e., the age distribution, preventability status, immunization status, etc., of measles cases reported in this issue remain the same as those presented in the previous issue[5].

Measles Clinical Presentation
Courtesy of Dr. J. H. Victor Marchessai

Figure 1
Reported cases of measles by month, Canada
1991–1995 (January)*



During the latter half of January 1995, a small outbreak involving eight cases was reported from the Peel Regional Health Unit in Ontario. All of the cases were students from one secondary school and had a history of receiving measles vaccine after the first birthday. Five of these cases were laboratory confirmed for IgM; the other cases were clinically diagnosed. With the exception of one clinical case from another health region in Ontario, no additional cases have been reported to date from other provinces or territories.

Table 1
Reported Cases of Measles, Canada, 1994

Province/Territory	(Preliminary Data) No. of Cases	%	Rate/ 100,000
Newfoundland	5	1.0	0.9
Prince Edward Island	0	0	0
Nova Scotia	1	0.2	0.1
New Brunswick	1	0.2	0.1
Quebec	128	24.7	1.8
Ontario	319	61.6	3.0
Manitoba	1	0.2	0.1
Saskatchewan	4	0.8	0.4
Alberta	31	6.0	1.2
British Columbia	38	5.4	0.8
Yukon	0	0	0
Northwest Territories	0	0	0
Canada	**518**	**100**	**1.8**

Editorial Comment

The reported measles activity across Canada in recent months suggests that the virus is confined to a specific geographic area in Ontario. However, the possibility of introducing the virus to other communities within or outside this province is feasible because of population mobility and other common activities.

Constant surveillance and timely reporting at all levels of government is essential to achieve measles elimination.

In view of the low measles incidence in Canada, it is important that each case receives specific attention and a thorough epidemiologic investigation.

In order to comply with the WHO/PAHO request for weekly notification, and as outlined in the Measles Consensus Conference[6], we are seeking your assistance in the timely reporting of all unusual incidents or outbreaks of measles, including epidemiologically linked clinical cases, to your provincial/territorial health authorities for subsequent notification to the Childhood Immunization Division, LCDC (Tel: 613-957-1344 or Fax: 613-998-6413).

We also welcome photographs of clinical presentation, including a brief note, for inclusion in upcoming issues of *Measles Update*.

Acknowledgement

The assistance and co-operation of all provincial and territorial epidemiologists, medical officers of health and other health care personnel, and staff from LCDC, is greatly appreciated.

References

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AN OUTBREAK OF MEASLES IN A SECONDARY SCHOOL, PEEL HEALTH REGION, ONTARIO, January-February, 1995

Brenda Smith, Grace Rylett, Peel Regional Health Unit, Bramptom, Ontario

The Peel Regional Health Unit received an IgM-positive laboratory report for measles on January 24, 1995. The case was a 14-year-old male who had presented to his family doctor on January 18 with symptoms of coryza and cough. A rash appeared as a "flushed face" on January 19. The secondary school student attended school for half the day to write an examination. The following day he was hospitalized in isolation for fever and concern regarding management of his diabetes. He had no known contact with a case of measles and had been appropriately immunized after his first birthday.

On February 1, another physician reported a clinical case of measles. This l4-year-old male had initially been seen on January 28 with a 3-day history of cough and coryza. He returned to the doctor on January 30 with a face rash and again on January 31 when the rash had spread to his body. Laboratory testing was IgM-positive for measles. He attended the same high school as the index case and had been immunized at 4 years of age. As of February 15, 1995, there were 10 cases of measles in the same school, five of which were laboratory confirmed.

Immunization Coverage and Action Taken

This secondary school has a total student population of 2,045, with ages ranging from 14 to 18 years. The overall measles-mumps-rubella (MMR) coverage (i.e., having documentation of adequate vaccination) was 95.5%. However, the **initial** evaluation, based on immunization data for MMR coverage available from the Health Unit, revealed that 1,800 (88.2%) of the students had been adequately vaccinated. Three students had documented exemptions (prior immunity) and there were no religious or conscientious exemptions. The remainder of the students (242) were classified in the exclusion category because no documented immunization records or evidence of prior immunity were on file for them with the Health Unit.

The Medical Officer of Health, under Section 22 of the Health Protection and Promotion Act, recommended exclusion from attending school for the 242 students and any teachers born after January 1, 1957, who could not provide documentation of immunization or immunity. A two-day screening and immunization clinic was set up. Forty-four children received MMR at the school clinic and 25 at their physician's office. During this period, however, 153 of the initially excluded students were able to document the date of vaccination for MMR.

From the approximately 150 teachers, 80 were evaluated for measles immune status and 62 of these were born after January 1, 1957. Table 1 summarizes the immunization status and action taken. Only 24% of those eligible for vaccination had a documented history of immunization. As a result, 63% received MMR at the school clinic.

Table 1
Immunization Status of Teachers and Action Taken

Number of teachers born after January 1, 1957	62
	Number
Provided dates of immunization	15
Received vaccine (MMR) at school clinic	39
Pregnant and undetermined immunity (titres for immunity being done)	3
Pregnant and immunized	2
Religious/conscientious objections (unimmunized)	1
Documented immunity	1
Absent	1
Total	**62**

Editorial Comment

This outbreak appears to be confined to one school and its magnitude seems to be small. The source of exposure of the index case was not traceable, as is often the situation. The report highlights the importance of having readily available databases containing immunization data for both students and teachers.

MEASLES ELIMINATION BY THE YEAR 2000

EPI Newsletter (Expanded Program on Immunization in the Americas), Vol. XVI, No. 5, 1994. (Pan American Health Organization, Washington, D.C.)

Following the successful effort to eradicate the wild polio virus from the Americas, the 24th Pan American Sanitary Conference resolved to set the target to eliminate measles from the Region by the year 2000.

Efforts to control measles began as soon as the vaccine was licensed in 1963. As the vaccine became more widely available and the governments in the Region began to include the vaccine in their immunization programs, the reported number of cases began to decrease dramatically between 1964 and 1969 (Figure 1).

In 1970 the Ministers of Health developed a Ten-Year Health Plan and set the goal of reducing measles mortality to the level of 1.0 case per 100,000 cases by 1980. However, no sound control strategies were implemented and this goal was not attained. Only the Bahamas, Barbados, Canada, China, and the United States were able to reach this goal. In 1977, the Expanded Program on Immunization (EPI) was established in the Americas and the coverage with measles vaccine began to improve. At the end of the 1970s, available data indicated that coverage rates for measles vaccine were not uniform throughout the Region nor within the countries themselves. At the end of 1980, vaccine figures from the different countries showed that coverage for children 12 to 23 months ranged from a high of 67% for two regions in Costa Rica to 31% for children in Santo Domingo in the Dominican Republic. As the use of measles vaccine in national immunization programs began to improve during the 1980s, measles vaccination in children < 12 months of age increased to 53% by 1984. By 1990 measles vaccine was being administered to 76% of children < 12 months of age.

By 1984, however, it was evident that the Region was experiencing cyclic epidemics of measles every 3 to 4 years despite the increase in vaccine coverage (Figure 1). In fact, measles epidemics appeared in countries like the United States with vaccine coverage rates > 95%. These epidemics were caused by the accumulation of large pools of susceptibles over a period of time due to unimmunized individuals. Furthermore, the age of disease incidence was being modified: measles outbreaks and sporadic cases began to be seen in older age groups.

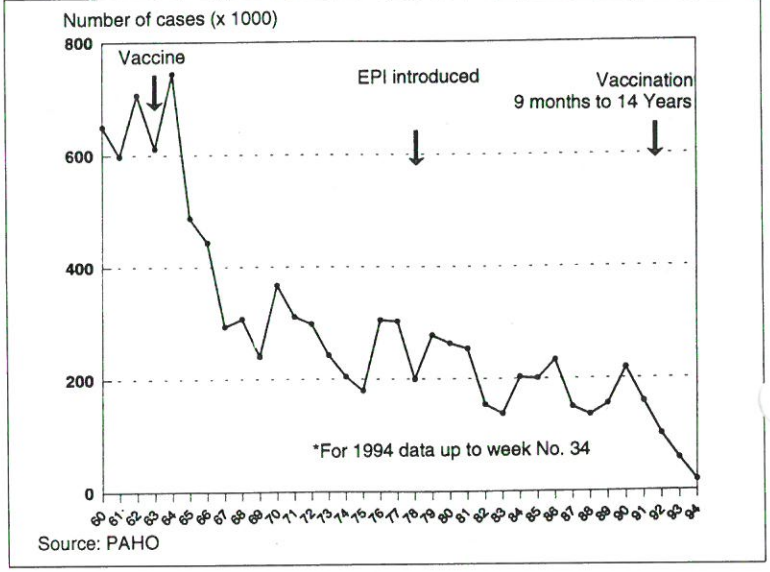
In 1986, Cuba decided to eliminate measles, and with technical support from the Pan American Health Organization (PAHO) launched a strategy where all children between the ages of 9 months and 14 years of age were vaccinated with measles vaccine independent of their previous vaccination status or disease history. The strategy was aimed at eliminating the pockets of susceptibles that potentially formed chains of disease transmission. Thereafter, each new cohort of newborns would have to be successfully vaccinated in order to prevent a build up of susceptibles.

In 1988, the Ministers of Health of the English Speaking Caribbean followed suit and launched a measles elimination effort using the same strategy. The Caribbean initiative, besides securing the technical cooperation from PAHO, was financially supported by Rotary International and the Canadian Public Health Association. This strategy proved to be effective, and soon thereafter Chile, Brazil, Mexico, and Argentina implemented the same strategy.

In addition, the Central American Ministers of Health and the Andean Ministers of Health also voted to eliminate measles from their sub-regions. Between 1992 and 1994 almost every country in the Region that had declared the goal of measles elimination had undertaken the strategy proposed by PAHO of a one-time vaccination of children 9 months to 14 years of age, followed by disease surveillance and routine vaccination of each new cohort of newborns. Both Canada and the United States have also declared measles elimination goals. The undertaking by the governments of the Region in implementing the one-time measles campaign within a 2-year period resulted in the dramatic reduction of reported measles cases in the Region as shown in Figure 1.

With the remarkable success being made against measles, the Pan American Sanitary Conference, in their meeting held in Washington, D.C., in September, 1994, set the target of measles elimination for the Western Hemisphere by the year 2000.

Figure 1
Number of Measles Cases Notified in the Region of the Americas, 1960 - 1994*



MASS CAMPAIGN TO ELIMINATE MEASLES FROM THE UNITED KINGDOM

David M.Salisbury, Department of Health, London, United Kingdom

Epidemiology

With the introduction of measles vaccine in 1968, control of the disease has consistently improved as immunization coverage has risen (Figure 1). Prior to immunization, measles epidemics occurred every other year in the spring; up to 500,000 cases were notified in epidemic years. The peak age of measles infection was around 3 to 5 years. In recent years, notifications have fallen to around 20/100,000 population. There have been no acute measles - related deaths since 1989; numbers of deaths from subacute sclerosing panencephalitis (SSPE) have declined progressively. Present age-specific notification rates suggest that the mode for cases of measles is in children < 2 years of age.

Immunization program

Measles immunization was introduced in 1968 but coverage only rose slowly. Vaccine administration was recommended at 12 to 15 months of age. By 1988, national coverage had risen to 80% at which time the single antigen measles vaccine was replaced by MMR vaccine. With the introduction of MMR vaccine, it was also recommended that all children presenting for their pre-school booster doses of diphtheria and tetanus and polio vaccines (at around 4 years of age) should also receive MMR vaccine, irrespective of history of previous measles immunization. It was not recommended that those children who entered the MMR program after October 1990 should have a second dose of MMR vaccine. The MMR program was actively supported by continuous promotion on television and in the press; coverage rose rapidly and has been around 93%, by the second birthday, for the last 2 to 3 years.

Measles surveillance

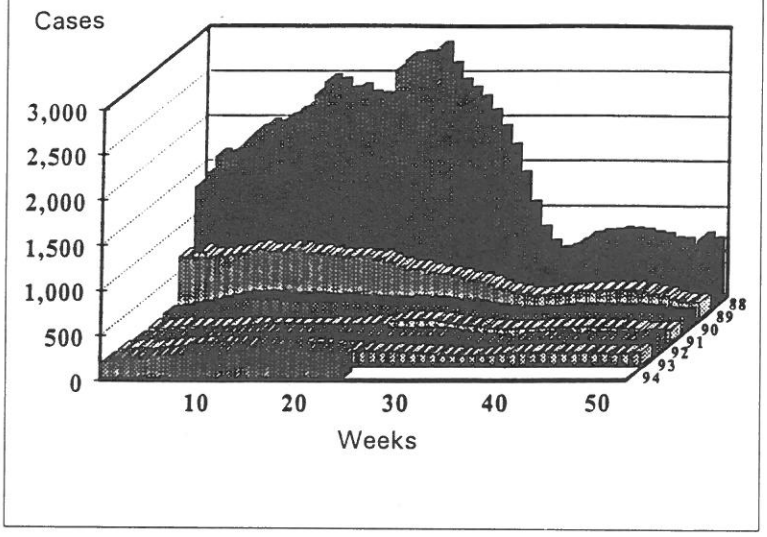
Measles has been a statutorily notifiable disease for over 50 years. Each Health District reports, on a weekly basis, measles notifications that have been submitted by primary care physicians and pediatricians. Measles deaths are selectively reported to the Department of Health and the Communicable Disease Surveillance Centre by the Office of Population Censuses and Surveys (OPCS) to whom all weekly notifications and all deaths are submitted. Anonymous sero-samples are collected every year from all sectors of the population and are analysed for sero-epidemiologic purposes. There is stimulated surveillance of SSPE through the British Paediatric Surveillance Unit whereby all consultant pediatricians are requested to report, monthly, any of a dozen rare diseases presently under surveillance. Other conditions include congenital rubella syndrome and acute flaccid paralysis.

Measles (or MMR) immunization coverage is determined quarterly for all children reaching their second birthday. Results of national coverage measurement are available approximately 2 months after the end of the closing date for the cohort specifications. Recently, studies have been undertaken to examine the sensitivity and specificity of salivary antibodies for confirmation of measles (and mumps and rubella) in notified cases. The feasibility of introducing a salivary antibody analysis for routine use nationally is presently being considered.

The present situation

From the continuous monitoring of age-specific sero-epidemiology, it has become increasingly apparent that there is a large pool of susceptible individuals in the UK population. This pool of susceptibles, most of whom are of secondary school age, has come about as a consequence of both low immunization coverage in the past suppressing, but not interrupting, measles transmission, and individuals neither being infected nor immunized. Investigation into the application of salivary antibodies for case confirmation has revealed that the age-specific notification data are significantly flawed. Many of the notified cases of measles in children < 5 years of age, and especially < 2 years of age, are unlikely to be measles. The only cases of measles that are being correctly diagnosed are those in secondary school-age children, particularly those cases occurring in clusters in school outbreaks. Despite these factors, it does appear that there is already an increase in measles notifications that is reason for concern. Based on the experiences of other

Figure 1
Measles notifications, England and Wales, 1988 to 1994



European countries with high levels of measles coverage, this increase is likely to presage a measles epidemic in the near future.

Accordingly, there are two groups of mathematical modellers, one based at the Wellcome Department of Infectious Disease Epidemiology, University of Oxford, and the other at the Communicable Disease Surveillance Centre. Each group has had access to all past immunization data and the most up-to-date notification data, the age-specific sero-epidemiology and the results of the age-specific notification data, corrected for probability of accuracy of diagnosis. Using two different types of models, both groups have reached the same prediction that the UK faces a significant measles epidemic in the near future, unless active steps are taken for prevention. The models predict an epidemic of 100,000 to 200,000 cases with around 50 deaths in secondary school-aged children. Two thirds of the cases would be in this group with one third in primary school-aged children. The impact of a range of intervention strategies has also been examined.

Based on the above measles epidemic predictions, detailed estimates have been made for cost-benefit analysis of prevention and epidemic costs. The cost of a measles epidemic is around three times the cost of its prevention, if this takes the form of a national measles immunization campaign targeted at all school children aged between 5 and 16 years and delivered over a short period of time. The modellers have also examined the impact of such a campaign on the epidemiology of measles with an objective of measles elimination. Such a campaign has a high probability of interrupting measles transmission; if present high levels of vaccine coverage are maintained and supplemented either by a second dose strategy for all children, given at school entry, or by subsequent measles immunization campaigns, then it is quite possible that the UK will shortly achieve measles elimination.

The campaign

In November 1994, health officials started a nationwide school-based campaign to immunize all children aged 5 to 16 years (around 8 million in total) with MR (measles rubella) vaccine, irrespective of previous immunization or history of measles or rubella. MR vaccine was chosen because it will permit the cessation of the present program of giving rubella vaccine to 11-year-old school girls and will also fill out the susceptibility window that presently occurs in teenage boys. Screening for rubella susceptibility will still continue for all pregnant women with postpartum immunization for those found to be susceptible.

The immunization campaign, carried out by teams of nurses, either employed in community child health departments or recruited especially for the length of the campaign, was to take place over 1 month with approximately 1 week for finding any children who were absent from school on the day of immunization.

The cost of the campaign is estimated at $33 million U.S. This includes an extensive advertising campaign, which started in October, vaccine bought on central contract and national delivery of the campaign services.

Conclusions

Measles notifications in the UK had fallen to record low levels following the attainment of high levels of coverage by the second birthday. No child has died of measles since 1989. However, there are signs of concern that a measles epidemic is likely to strike the school-aged population, especially the older school-aged children, in 1995.

Full costs of a national measles immunization campaign and the predicted epidemic confirm that this is a cost-effective use of health resources. This campaign, in addition to preventing a measles epidemic, is an important stepping stone on the path to measles elimination. As well as being the first industrialized country to employ a measles immunization campaign in this way, the UK could also be the first country worldwide to introduce salivary antibody detection for future routine surveillance of measles.

Announcement

19TH INTERNATIONAL CONGRESS OF CHEMOTHERAPY

16 to 21 July, 1995
Montreal, Quebec

The theme for this congress is "100 Years after Pasteur — A New Age in Chemotherapy", marking the 100th anniversary of Pasteur's death. Program topics will focus on the links between infectious diseases and cancer and shared issues in their control and treatment. Three hundred invited speakers and 1,500 abstracts are expected from around the world. One of the symposia will be devoted to viral vaccines with a presentation by C.J. Clements from Switzerland entitled "Measles: Prospects for Elimination and Eradication by Vaccination".

For further information and registration, please contact the **19th ICC Secretariat, 205 Viger Avenue West, Suite 207, Montreal, Quebec, Canada H2Z 1G2; Tel. (514) 871-1995 or Fax: (514) 871-2870.**

Submissions of pertinent reports/epi notes are welcome and success of this endeavour depends upon the readers' interest and cooperation. Priority for inclusion in the newsletter is determined by the article's relevancy. This is not a formal publication, and the views and interpretation may not necessarily reflect Health Canada's position. Distribution is free of charge. Anyone wishing to receive a copy on a regular basis should contact the Childhood Immunization Division, Bureau of Communicable Disease Epidemiology, LCDC, Ottawa, Ontario, K1A 0L2; telephone (613) 957-1340; Fax (613) 998-6413.

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