



MEASLES

update



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EPIDEMIOLOGICAL LINK OF MEASLES CASES — ALBERTA (April to June 1994)

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During the spring of 1994, eight cases of measles, seven of which were linked, occurred in Calgary. Subsequent investigation and contact follow-up involved two high schools, three fast-food restaurants, hospital emergency departments, an adult employment centre, day-care and day-home facilities, doctors' offices, and numerous family members (Figure 1, Table 1).

Of the eight laboratory-confirmed cases of measles, six had previously received a documented live measles vaccine or a MMR vaccine. The measles vaccine status for the other two cases was not known. Ages of the cases ranged from 30 months to 30 years. From 1987 to 1993, 96% to 98% of students leaving Grade 9 had been vaccinated for measles.

On May 5, 1994, the Calgary Health Services (CHS) received a call from a parent reporting that his 19-year-old son (Case 1) had been clinically diagnosed with measles. The diagnosis was serologically confirmed on May 9. This case had received a MMR vaccine in 1976 (at 14 months of age). A subsequent investigation revealed that the boy attended a local high school (High School 1) and worked at a pizza restaurant. Upon investigation, it was determined that another restaurant employee (Case 2) had been absent from work in April with a rash and fever. This case became ill on April 24 following his return from Toronto where he had had several interviews at various colleges during the Easter holidays and had been in contact with many other students from different places across Canada. Although he felt ill upon his return to Calgary, he continued to work and to attend school (High School 2). He was too ill to work on April 24. When he saw his doctor the following day, he fainted and was immediately sent by ambulance to the hospital. Although he was initially diagnosed with toxic shock syndrome, measles was serologically confirmed on May 11. He was never isolated while in the hospital. This case had received a dose of documented live measles vaccine in 1976 (at 12 months of age) and a dose of MMR vaccine in 1978.

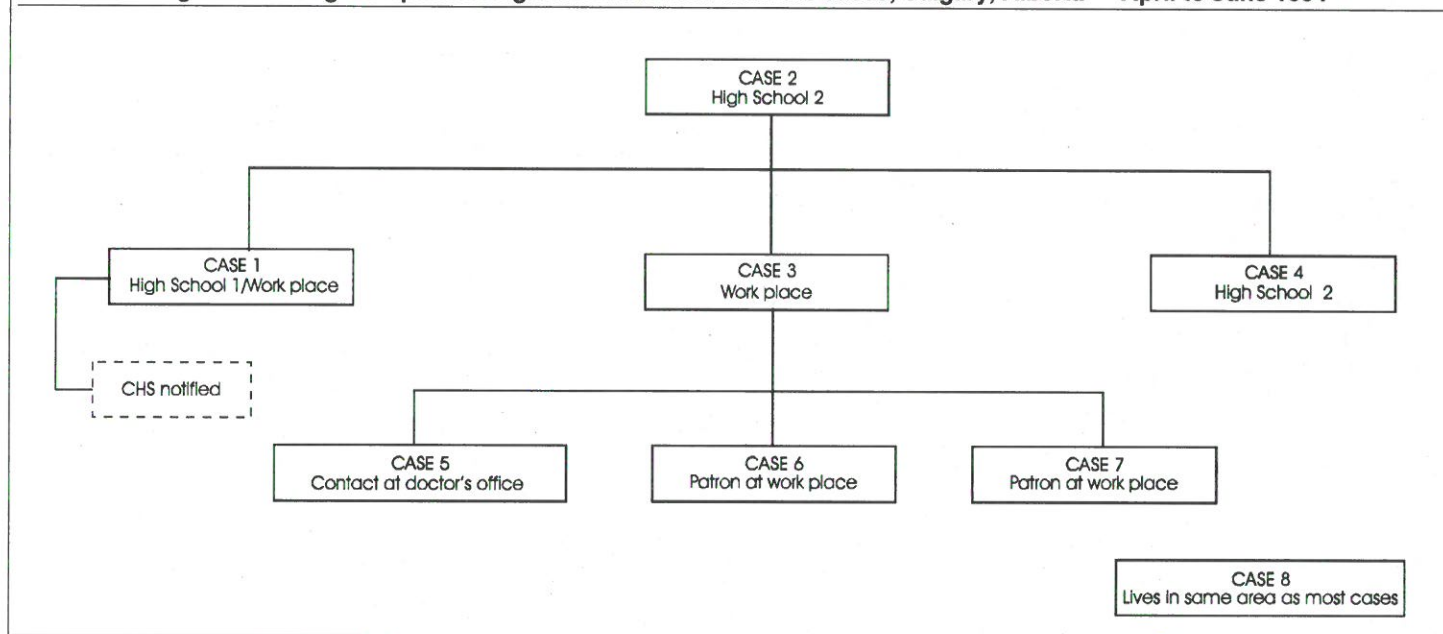
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A child with generalized measles rash
Courtesy of Dr. A. Bentsi-Enchill

Figure 1
Diagram showing the epidemiological link between measles cases, Calgary, Alberta — April to June 1994



Investigation was commenced at both high schools. A student, (Case 4) with measles symptoms was identified at High School 2. A laboratory confirmation of measles for this case was obtained on May 13. Follow-up of contacts included the staff from another restaurant and patients visiting a walk-in clinic where this student was seen earlier but not diagnosed. Case 4 had received a live measles vaccine in 1979 (at 14 months of age) and a MMR vaccine in 1983.

A third restaurant employee (Case 3) became ill just prior to the start of this investigation; measles was confirmed on May 13. He had continued to work even though he was ill. He had gone to a walk-in medical clinic and then to the hospital emergency where he was diagnosed with measles. The hospital had not isolated him from other patients or identified staff or other patients who had been in the emergency department at the same time. Case 3 did not attend high school. He had received a live measles vaccine in 1975 (at 16 months of age).

Table 1 Contact follow-up of measles cases in Calgary, Alberta — 1994	
Location	Number of contacts
Two high schools	2,500
Work places	150
Doctors' offices	50
Hospital emergency departments	36
Day-care/Day-home facilities	55
Employment centre	27
Family contacts	Numerous

The records of approximately 2,500 students and staff at High Schools 1 and 2 were assessed for measles vaccination. A total of 98 (3.9%) students were vaccinated for measles. Three students who refused vaccination were excluded.

A 30-month-old child (Case 6) attending day care was diagnosed with measles and laboratory confirmation was received on May 25. She had been at the restaurant on May 16 when Case 3 was working and was infectious. Follow-up of 36 day-care contacts included vaccination of two children, immune globulin (IG) for six children < 1 year of age and the exclusion of six children from day care for 2 weeks. Case 6 received a MMR vaccine in 1992 (at 12 months of age).

The next case of measles occurred in a 23-year-old male (Case 7) who was diagnosed with laboratory-confirmed measles on May 29. He also had eaten at the restaurant on May 16 when Case 3 was working. Follow-up included friends and work contacts. Two contacts were vaccinated with MMR vaccine and one child < 1 year of age was given IG. No conclusive record of measles vaccine could be found for Case 7.

On May 7, when Case 3 was at the walk-in clinic, a single mother (Case 5) was also there waiting to see the doctor about her child. She subsequently developed symptoms and was admitted to the hospital on May 21 where a laboratory diagnosis of measles was obtained on May 25. She was in isolation while in the hospital. Follow-up involved those in the employment class she attended, family and friends, and day-home contacts of her children. Of the 40 contacts that were assessed, 28 adults were

referred for vaccine, and two infants < 1 year were given IG. No conclusive record of measles vaccine could be found for Case 5.

One additional case of measles, in a 30-year-old male (Case 8), was diagnosed on June 18. No connection with previous cases was identified, although the man lived and worked in the same geographic area where all of the other cases were identified. This case spent 9 hours in a hospital emergency room and was later admitted. He was never isolated. Fifty-seven hospital contacts, patients and staff were identified. No one was vaccinated because the diagnosis was made too late for the vaccine to be effective. Contacts were advised regarding signs and symptoms of measles and urged to contact public health staff if anything occurred. No additional cases were identified.

Up to December 31, 1994, 73 additional suspect cases of measles were reported to the Calgary Health Services. Most cases did not meet the clinical case definition for measles and where serology was obtained the results were negative for measles IgM. Therefore, no further cases of measles have been identified. After the investigation, we became aware of the outbreak of measles that had occurred in a high school in London, Ontario, at about the same time. Our outbreak began at the same time as the index case occurred in the Ontario outbreak.

MEASLES IN CANADA, 1995 (as of May 8)

Paul Varughese, Childhood Immunization Division, Bureau of Communicable Disease Epidemiology, LCDC, Ottawa

From January 1 to May 8, 1995, a provisional total of 151 measles cases (0.52/100,000 population) has been reported in Canada. This is 1.4 times greater than the 104 cases reported for the same period in 1994. Figure 1 shows the trend in reported incidence by month from January 1, 1991 to May 8, 1995.

During the past 4 months, six of the 10 provinces reported measles activity and the number of cases ranged from 2 to 136; no cases were reported from the Territories. Ontario accounted for the majority of cases (90%; 1.3/100,000 population).

In Ontario, 10 of the 42 Health Units have reported measles, ranging from 1 to 112 cases, the highest being reported from Peel Health Region, which has been experiencing an ongoing occurrence of measles since mid-January. This health unit also has the largest population in Ontario (approximately 732,000). A brief report on a cluster of cases involving high school students was presented in an earlier issue of this newsletter⁽¹⁾. As a result, in response to this resurgence, the local and provincial public health

Conclusions

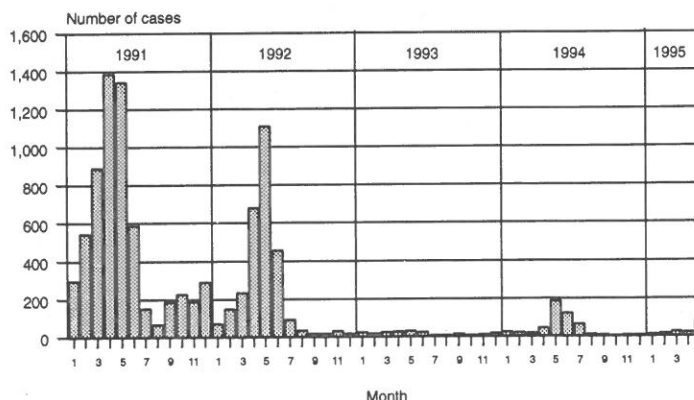
1. This outbreak emphasizes the highly infectious nature of measles: three cases were linked to Case 3, even though the contact time was short.
2. Hospital emergencies and medical clinics need to review infection control policies to minimize contact with clients who may have serious airborne infections. They also need to take an active role to ensure prompt identification of contacts when the diagnosis is made. Timely communication and consultation with public health staff is extremely important.
3. Publications such as "Measles Update" are valuable in disseminating information on outbreaks occurring in other parts of Canada.
4. More studies are needed on long-term vaccine efficacy and primary vaccine failures.

Editorial Comment

Characterization of an outbreak, whether it is large or small, enriches our knowledge and understanding of the current epidemiology of the disease in Canada.

officials are taking appropriate control measures, including enhanced case investigation, review of school immunization records, and offering immunization to those who are identified as lacking documentation of measles vaccination or immunity.

Figure 1
Reported cases of measles by month,
Canada, 1991-1995*



*Provisional data

Laboratory Confirmation

Of the 151 cases, 141 were reviewed and 96 (68%) had a laboratory confirmation. Most of these were positive for IgM; other cases were clinically diagnosed.

Age Distribution

Cases were distributed in all age groups (Figure 2) and their ages ranged from 6 months to 66 years, with a median of 13 years. Four cases were infants < 1 year. The highest percentage of cases were represented by those 10 to 14 years of age (35%), followed by those 15 to 19 (26%) and those 5 to 9 (24%). Five cases were over 30 years. The highest frequency was among 15-year-olds (22 cases).

Vaccination Status and Preventability

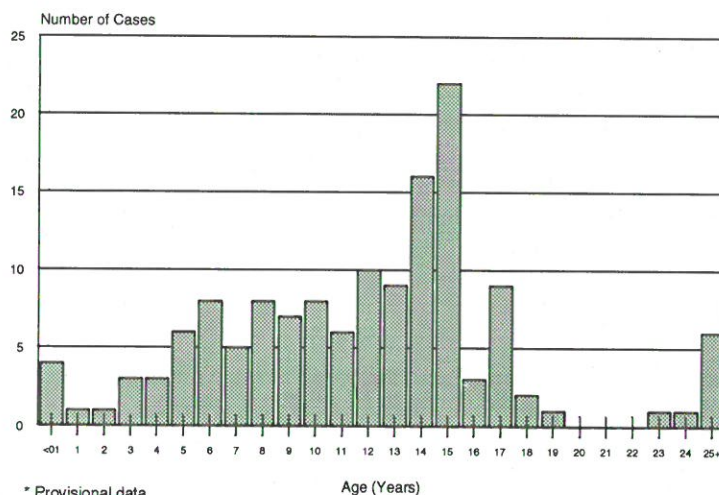
At least 85% of the 141 cases reviewed had a documented history of measles vaccination; four cases (3%) had no prior vaccination and were infants < 1 year of age (not eligible for vaccination). Immunization status was unknown or unavailable for 16 (14%) cases and their ages ranged from 4 to 66 years (median: 20 years).

Comment

The reported measles activity in Canada in recent months suggests that currently the circulation of measles virus is confined to Ontario, and involves a large urban area. Despite the ongoing circulation and movement of population, the cumulative total number of measles reported is still low compared with incidence in the past few years. The spread of measles to surrounding areas is presently limited. Sporadic cases have been reported from other health units within Ontario and five other provinces.

Because there is a high rate of measles vaccine coverage, and some vaccine failures are expected, most cases have a history of vaccination with one dose of MMR. The cases lacking

Figure 2
Age distribution of measles cases in Canada
January 1 to May 8, 1995*



documentation of measles vaccination are generally in older individuals.

Constant surveillance and timely reporting at all levels of government is required for the success of measles elimination efforts.

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

Acknowledgment

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.

Reference

1. Smith B. *An outbreak of measles in a secondary school, Peel Health Region, Ontario, January-February, 1995.* Measles Update 1995;3(1):3.

EXPANDED PROGRAMME ON IMMUNIZATION

Strategies to minimize nosocomial measles transmission

WHO Weekly Epidemiological Record, Vol 70, No 9, 1995

The relative contribution of nosocomial transmission to the overall incidence of measles appears to vary considerably, in accordance with the prevailing epidemiological pattern of measles. Several studies demonstrate that nosocomial contact (contact within a health care setting) is an important mechanism for transmission of measles in industrialized countries and in the urban setting in developing countries. However, transmission by

the nosocomial route probably does not contribute significantly to measles incidence in rural communities in developing countries, where immunization coverage remains low to moderate, and where either access to health facilities or their use by community members for diseases like measles is limited.

It will be very difficult to eliminate nosocomial transmission entirely, because of a number of limiting factors, including the highly contagious nature of the disease in the incubation phase. However, several strategies are available to minimize nosocomial

spread. It is vital to raise awareness among staff that a measles case could enter a health facility at any time so that they remain alert to the constant risk of nosocomial spread of measles to non-immune persons.

■ *Maintain high measles immunization coverage in the community*

Nosocomial spread of measles may be minimized most effectively by maintaining measles immunization coverage in the community as high as possible in order to prevent accumulation of susceptible individuals. Several operational strategies for achieving high coverage have been described. According to the epidemiological conditions prevalent and resources available, a combination of strategies may be required including routine immunization, special actions for high-risk groups or areas, national immunization days and mass campaigns.

■ *Reduce the age for vaccination during outbreaks*

The World Health Organization (WHO) recommends that the age for administration of measles vaccine be lowered to 6 months while measles outbreaks are in progress in the community. Vaccine should be administered any time after the child reaches 6 months of age; for infants immunized between 6 and 9 months of age, a second dose should be administered as soon as possible after the child reaches 9 months provided that at least 4 weeks have elapsed since the last dose. In industrialized countries, this can be delayed to 12 or 15 months of age, depending on national schedules.

The second dose, at 9 months of age, is important because the serological response to a dose given before the recommended age for immunization may be significantly lower, resulting in lower levels of protection. At the time the early dose is administered, parents should receive instructions regarding the importance of the second dose.

■ *Eliminate missed opportunities for immunization*

Missed opportunities for immunization should be minimized by checking the immunization status of all children attending any health facility for any reason. A history of measles disease is not a sufficient reason to defer immunization, since other fever and rash illnesses may be mistaken for measles. Furthermore, a verbal history of measles immunization is not reliable - only documentation on the immunization card should be accepted.

In developing countries, where immunization cards, "road to health" cards or clinic records are often missing, local conditions should be evaluated when determining the criteria for administering measles vaccine to children attending a health facility and whose immunization status cannot be verified. In general, during a measles outbreak all children aged 6 months to 9 years without documented evidence of measles immunization should receive measles vaccine. In the absence of measles outbreaks, all children aged 9 months to *at least* 2 years without documented evidence of measles vaccination should receive measles vaccine. Any child eligible for measles vaccine or other antigens should receive the appropriate catch-up doses before leaving the facility. This also applies to any woman eligible for tetanus toxoid.

■ *Ensure adequate measles immunization status among hospitalized patients*

The immunization status of all hospitalized children should be rigorously checked. In developing countries, because of the high risk of transmission in medical settings, WHO recommends that a dose of measles vaccine be given to all unimmunized children from the age of 6 months upon admission to hospital. The precise age range targeted may be adjusted in the light of local conditions. Even under ideal circumstances, measles vaccine is associated with an efficacy of only 80% to 90% in developing countries. Greater levels of protection may therefore be achieved by administering a dose of measles vaccine upon admission to hospital, even to infants and children thought to be already immunized. In addition, the immunization status of patients should be checked again before discharge, to reduce the chances of a child returning home while incubating a nosocomially-acquired measles infection. In outbreaks in industrialized countries, it may be sufficient to immunize only those admitted patients who lack documentation of immunization.

Exposed non-immune contacts of hospitalized measles cases, such as patients sharing the same ward and visitors, aged 6 months to 9 years, should receive one dose of measles vaccine, where possible, within 72 hours of exposure. The use of hyper-immune measles gammaglobulin (IMGG) may be less effective and much more costly than measles vaccine for use with non-immunocompromised patients.

■ *Isolate fever and rash cases upon arrival*

Cases of fever and rash should be considered as suspected measles until proven otherwise. Differential diagnoses include dengue fever, meningococcal meningitis, rubella, and other viral exanthems. To reduce the chance of exposure, cases of fever and rash presenting at a health facility should, where possible, not enter the common waiting areas. Where available, such cases should be fitted with a mask and taken directly to a different room reserved for diseases subject to respiratory isolation.

If possible, waiting and treatment areas should be well ventilated, and care should be taken to ensure that sick and well children do not subsequently share the same room or same staff for weighing, clinical examination, immunization or other consultation, since this would clearly allow the possibility of measles transmission.

Where female literacy is common, a sign may be mounted outside the health facility instructing parents/guardians bringing a child with rash to wait outside and ask another person to inform the staff that the child has arrived.

To reduce the severity and risk of complications following measles illness, vitamin A supplements should be administered, according to published WHO guidelines, to all children admitted to hospital who are suspected of having measles.

■ *Ensure adequate measles immunization status among health staff*

To prevent nosocomial spread of measles in the hospital setting, all staff should be immune. Most adults in developing

countries will have natural immunity already. In industrialized countries, where young adults may not be immune, any staff member who cannot provide documentary proof of measles immunization or adequate measles antibody titres at the time of employment should be considered for a dose of measles vaccine. Candidates should first be screened for contraindications such as pregnancy and immune suppression.

■ ***Administer gammaglobulin to immunocompromised contacts of measles cases***

Because of the risk of overwhelming viraemia, live virus vaccines, such as measles vaccine, are contraindicated in individuals with congenital disorders of immune function or those receiving immunosuppressive therapy. Hence, immunocompromised contacts of measles cases should receive

hyperimmune measles gammaglobulin (IMGG) as soon as possible after exposure.

■ ***Inform the health authorities***

Measles is a reportable disease in almost all countries. All cases of measles should be reported promptly to the district health authorities in accordance with local procedures. In addition, where appropriate, nosocomially-acquired measles cases should be reported at once to hospital infection control authorities for immediate investigation and response.

The monograph *Measles control in the 1990s: minimizing nosocomial transmission* (WHO/EPI/GEN/94.6) is available upon request from the **Global Programme for Vaccines and Immunization, WHO, 1211 Geneva 27, Switzerland.**

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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